

Phylum **Nematoda** Cobb 1932<sup>1, 2</sup> (3 classes)<sup>3,4,5,6,7</sup>

Class **Enoplea** Inglis 1983 (3 subclasses)<sup>8</sup>

Subclass **Enoplia** Pearse 1942 (2 superorders)

Superorder **Enoplica** Hodda 2007 (5 orders)<sup>9</sup>

Order **Enoplida** Filipjev 1929 (1 suborder)

Suborder **Enoplina** Chitwood & Chitwood 1937 (3 superfamilies)

Superfamily **Anoplostomatoidea** Gerlach & Riemann 1974 (1 family)<sup>10</sup>

Family **Anoplostomatidae** Gerlach & Riemann 1974 (2 subfamilies, 3 genera, 23 species)<sup>11,12</sup>

Superfamily **Enoploidea** Dujardin 1845 (2 families)

Family **Enoplidae** Dujardin 1845 (1 subfamily, 1 genus, 51 species)<sup>13</sup>

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1. **BY** Mike Hodda (for full contact address, see **Author name and address** after **References**); the title of this paper should be cited as "Phylum Nematoda Cobb 1932. In: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". Recent Nematoda includes 3 classes, 31 orders, 267 families, 2829 genera and 24,783 species, with fossil taxa represented in 2 genera by 10 species. There are 7 genera and 7 species known only as fossils.
  2. Rudolphi (1808) is most often cited as the author of the accepted name of the phylum, which is Nematoda. The first holophyletic diagnosis at Phylum rank used the name "Nemates" (Cobb 1932). The latter name has never been in wide use, and the competing claims of the two names have been discussed extensively (Chitwood 1957, 1958, Dougherty 1958a, 1958b). Following the principle outlined below, Cobb (1932) is cited as authority because his use is specifically as a phylum.
  3. The evolutionary affinities of Nematoda have long been controversial (see discussion in Hodda 2007). The most recent molecular evidence has favoured affinities first with Nematomorpha, then with decreasing relationships to Kinorhyncha, Priapulida and Loricifera within a superphylum Ecdysozoa (Aguinaldo *et al.* 1997, Dunn *et al.* 2008). However, significant unresolved differences between phylogenies hypothesised using different taxa, assumptions, methods and lines of evidence remain.
  4. Unless indicated otherwise, the classification follows Hodda (2007). The higher classification of the phylum has been interpreted in many ways, with consequent changes in the hierarchical level of many names (Hodda 2007). Above the level of the genus nematode classification has been—and continues to be—volatile. Particularly, analyses of accumulating molecular data have produced only broadly similar phylogenies, and consequently they implied only broadly similar classifications. In addition to topological differences, there remain substantial differences in the support for many groups, and support for branches are often low. Furthermore, composition and support for the various groups remains dependent on the genes and taxa selected as well as the methods of alignment and analysis (De Ley & Blaxter 2004, Hodda 2007, Holterman *et al.* 2006, Meldal *et al.* 2007, Nadler *et al.* 2007, Smythe *et al.* 2006, Van Megen *et al.* 2009). The present classification continues the tradition of regarding branch points in nematode phylogeny that are ambiguous, unsupported or differ between studies as polytomies (Hodda 2007).
  5. For Phylum Nematoda, authorities cited in brackets after the main authority are the first to use a name at a particular level, irrespective of the concept represented by the name, and irrespective of uses at other levels. Current names follow the Pearse (1936) system of endings for higher taxa, as advocated by several authors (Chitwood 1958, Pearse 1936), and in wide use. Earlier authors, and those from the former USSR, used a different system of endings, and have been cited as authorities if clearly indicating the use of the name at the particular rank, irrespective of the ending applied to the stem name. In many cases the lower-level taxa included in a group now differs substantially from those when the name was proposed. Taxa are listed in alphabetical order.
  6. The known diversity of Nematoda highly underestimates the estimated diversity, by a factor generally estimated at between 10 and 50, but which may be up to 3000 (Lambshad 1993, Brandt *et al.* 2007). Numbers of species in families generally follow the latest revision or checklist available, supplemented by electronic searches for subsequent descriptions (Anderson *et al.* 1974, Andrassy 1999, 2008, De Coninck 1965, Gerlach & Riemann 1974).
  7. Ecologically, the phylum has species occurring in every geographic region on earth, probably has parasitic species in every other animal phylum where the body is significantly larger than the nematodes, has species parasitizing all terrestrial or aquatic and a few marine plants (mostly externally and below ground, but also internally and in stems and seeds), and has free-living species in every habitat on earth where liquid water is ever present (including Antarctica and the Arctic sea ice). Trophically, free-living species consume most other types of small-bodied organisms. Generally, only live organisms are consumed; that is nematodes are not saprobes. Trophic categories follow Hodda *et al.* (2009).
  8. Enoplea have unique characters of the sperm nuclear envelope being retained in mature spermatozoa (absent in all other nematodes studied), no asymmetry in the dividing germ line (present in other nematodes), and no bilateral symmetry during early embryogenesis (present in other nematodes) (Baccetti *et al.* 1983, Justine 2002, Malakhov 1994, Schierenberg 2005, Voronov *et al.* 1998, Yushin 2003a,b). However, these character states are common in animals outside nematodes, and so they may represent plesiomorphies uninformative for phylogenetic analysis (Aleshin 2004). Oncholaimida have a nuclear envelope present (Yushin *et al.* 2002) as an apomorphy, but have affinities with Enoplia from molecular evidence (Holtermann *et al.* 2006, Meldal *et al.* 2007, Van Megen *et al.* 2009). Spermatogenesis and development also provide evidence for the separation of Enoplia from Dorylaimia and Chromadorea (Yushin & Malakhov 2004, Schierenberg & Lahl 2004).
  9. Classification generally follows Lorenzen (1994).
  10. Regarded as a superfamily on the basis of molecular evidence (Van Megen *et al.* 2009), as well as morphological differences (Lorenzen 1994) indicating that the clade is on the same level as the Enoploidea.
  11. Mostly marine, two species known from freshwater (Smol & Coomans 2006).
  12. Some molecular analysis suggests a close affinity to Enoplidae (Pegova *et al.* 2004). On this basis, only a single superfamily Enoploidea has been proposed (Smol & Coomans 2006). However, morphological evidence suggests a separate superfamily: the spacious, toothless buccal cavity surrounded by pharyngeal tissue only in the posterior section, the cephalic capsule lacking mucular insertions, and the constant position of the gonads to the left of the intestine are all apomorphic (Lorenzen 1994). Molecular analyses in broader contexts also suggest Enoplidae and Thoracostomopsidae are a separate clade from Anoplostomatidae (Van Megen *et al.* 2009) or the relationships are unresolved (Meldal *et al.* 2007). Hence a separate superfamily is justified.
  13. Marine, microbivorous or predatory.

- Family **Thoracostomopsidae** Filipjev 1927 (3 subfamilies, 21 genera, 197 species)<sup>14</sup>
- Superfamily **Phanodermatoidea** Schuurmans Stekhoven 1935 (2 families)<sup>15</sup>
- Family **Anticomidae** Filipjev 1918 (Hope & Murphy 1972) (1 subfamily, 6 genera, 63 species)<sup>16,17</sup>
- Family **Phanodermatidae** Schuurmans Stekhoven 1935 (2 subfamilies, 9 genera, 72 species)<sup>18</sup>
- Order **Ironida** Hodda 2007 (4 suborders)<sup>19</sup>
- Suborder **Ironina** Siddiqi 1983 (1 superfamily)
- Superfamily **Ironoidea** De Man 1876 (3 families)
- Family **Ironidae** De Man 1876 (3 subfamilies, 11 genera, 67 species)<sup>20</sup>
- Suborder **Oxystominina** Siddiqi 1983 (2 families)<sup>21</sup>
- Superfamily **Oxystominoidea** Filipjev 1918 (2 families)
- Family **Leptosomatidae** Filipjev 1916 (8 subfamilies, 34 genera, 188 species)<sup>22</sup>
- Family **Oxystominidae** Filipjev 1918 (De Coninck & Schuurmans Stekhoven 1933) (3 subfamilies, 12 genera, 171 species)<sup>23,24</sup>
- Suborder **Rhabdolaimina** n. rank (1 superfamily)<sup>25</sup>
- Superfamily **Rhabdolaimoidea** Chitwood 1951 (n. rank) (2 families)<sup>26</sup>
- Family **Andrassyidae** Tchesunov & Gagarin 1999 (2 genera, 3 species)<sup>27,28</sup>
- Family **Rhabdolaimidae** Chitwood 1951 (Gerlach & Riemann 1974) (3 subfamilies, 7 genera, 23 species)
- Suborder **Campydorina** Jairajpuri 1983 (1 superfamily)<sup>29</sup>
- Superfamily **Campydoroidea** Clark 1961 (Jairajpuri *et al.* 1976) (1 family)
- Family **Campydoridae** Clark 1961 (1 genus, 2 species)<sup>30</sup>
- Order **Tripyloidida** Hodda 2007 (1 superfamily)
- Suborder **Tripyloidina** De Coninck 1965 (1 family)
- Superfamily **Tripyloidoidea** De Coninck & Schuurmans Stekhoven 1933 (De Coninck 1965)
- Family **Tripyloididae** De Coninck & Schuurmans Stekhoven 1933 (1 subfamily, 8 genera, 52 species)<sup>31</sup>

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14. Mostly marine, three species from freshwater, predatory (Smol & Coomans 2006).
  15. Regarded as a superfamily because both molecular and morphological evidence indicates divergence on the same level as Enoploidea and Anoplostomatoidea (Van Megen *et al.* 2009, Lorenzen 1994).
  16. Regarded as related to the Phanodermatidae on the basis of similarities in the development of the cephalic region (Lorenzen 1994).
  17. Marine, microbivorous.
  18. Marine, microbivorous.
  19. Classified at order level by Hodda (2007) on the basis of the affinities remaining unresolved (Holterman *et al.* 2006, Meldal *et al.* 2007, Smythe *et al.* 2006).
  20. Subfamily Ironinae De Man 1876 occurs in freshwater aquatic and moist terrestrial habitats, while subfamily Thalassironinae Andrassy 1976 is marine.
  21. Originally placed in order Alaimida on the basis of general similarities in the thin body shape and the rudimentary buccal cavity, here regarded as a suborder of Ironida on the basis of the oesophageal outline, the position of oesophageal glands, and molecular evidence.
  22. Marine, microbivorous.
  23. Mostly marine, but nine species are freshwater aquatic (Smol & Coomans 2006); microbivorous.
  24. Created as subfamily Oxystomatinae by Filipjev (1918), and Oxystomininae by Chitwood (1935), raised to family by De Coninck & Schuurmans Stekhoven (1933).
  25. Placed in Leptolaimoidea (Plectida) by De Ley & Blaxter (2004). Some molecular evidence suggests affinities with some Enoplida, Oncholaimida, and Tripylida (Holterman *et al.* 2006). The position of the genus *Syringolaimus* needs clarification, but if included in the Rhabdolaimidae, then the Rhabdolaimidae fits with Enoplica on molecular evidence (Meldal *et al.* 2007). The Rhabdolaimidae can be placed in Enoplida on the morphological characters of non-spiral and pocket shaped amphids (Lorenzen 1994). Curiously, Lorenzen (1994) excluded *Syringolaimus* from Rhabdolaimidae, placing it instead in Ironidae. Maggenti (1963) included the genus in Rhabdolaimidae. Placed as a suborder of Ironida in the current classification on the basis of the similarity of three anteriorly-placed teeth in an elongate buccal cavity, and an unequivocal placement within Ironida on molecular evidence (Van Megen *et al.* 2009).
  26. n. rank.
  27. Shares a number of morphological characteristics with Rhabdolaimidae (Tchesunov & Gagarin 1999). Other characters are in an unusual combination. Molecular data is lacking. The family may warrant a separate suborder. More investigation is warranted.
  28. Terrestrial, feeding habits unknown.
  29. Originally proposed under order Dorylaimida (Jairajpuri 1983), but very soon afterwards proposed independently in the order Enoplida (Siddiqi 1983). Hodda (2007) placed Campydorida as an order under Enoplica, on the basis of molecular evidence (Mullin *et al.* 2003). More recent molecular analyses suggest affinities with Ironina (Van Megen *et al.* 2009), so the group is now placed as a suborder within Ironida. Morphological characters can be interpreted in many ways, so do not provide unambiguous evidence for phylogeny.
  30. Terrestrial, omnivorous.
  31. Marine, microbivorous.

- Superfamily **Trischistomatoidea** Andrassy 2007 (Zhao 2011) (1 family)  
 Family **Trischistomatidae** Andrassy 2007 (Zhao 2011) (1 subfamily, 2 genera, 17 species)<sup>32</sup>  
 Order **Alaimida** Siddiqi 1983 (1 suborder)<sup>33</sup>  
 Suborder **Alaimina** Clark 1961 (1 superfamily)  
 Superfamily **Alaimoidea** Micoletzky 1922 (1 family)  
 Family **Alaimidae** Micoletzky 1922 (3 subfamilies, 13 genera, 142 species)<sup>34</sup>  
 Order **Trefusiida** Lorenzen 1981 (1 suborder)<sup>35</sup>  
 Suborder **Trefusiina** Siddiqi 1983 (1 superfamily)  
 Superfamily **Trefusioidea** Gerlach 1966 (4 families)<sup>36</sup>  
 Family **Lauratonematidae** Gerlach 1953 (1 subfamily, 3 genera, 12 species)<sup>37</sup>  
 Family **Simpliconematidae** Blome & Schrage 1985 (1 subfamily, 1 genus, 3 species)<sup>38</sup>  
 Family **Trefusiidae** Gerlach 1966 (1 subfamily, 6 genera, 38 species)<sup>39</sup>  
 Family **Xenellidae** De Coninck 1965 (2 genera, 5 species)<sup>40</sup>  
 Superorder **Rhaphothyreica** n. rank (1 order)<sup>41</sup>  
 Order **Rhaphothyreida** Tchesunov 1997 (1 suborder)  
 Suborder **Rhaphothyreina** Hodda 2007 (1 superfamily)  
 Superfamily **Rhaphothyreioidea** Hope & Murphy 1969 (1 family)<sup>42</sup>  
 Family **Rhaphothyreidae** Hope & Murphy 1969 (1 genus, 2 species)<sup>43</sup>  
 Subclass **Oncholaimia** Hodda 2007  
 Superorder **Oncholaimica** Hodda 2007 (1 order)<sup>44</sup>  
 Order **Oncholaimida** Siddiqi 1983 (1 suborder)<sup>45</sup>  
 Suborder **Oncholaimina** De Coninck 1965 (1 superfamily)  
 Superfamily **Oncholaimoidea** Filipjev 1916 (De Coninck 1965) (2 families)<sup>46</sup>  
 Family **Enchelidiidae** Filipjev 1918 (1 subfamily, 18 genera, 171 species)<sup>47</sup>  
 Family **Oncholaimidae** Filipjev 1916 (7 subfamilies, 34 genera, 353 species)<sup>48</sup>  
 Subclass **Triplonchia** Hodda 2007 (1 superorder)<sup>49</sup>  
 Superorder **Triplonchica** Hodda 2007 (2 orders)  
 Order **Triplonchida** Cobb 1920 (1 suborder)<sup>50</sup>

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32. Freshwater aquatic, microbivorous.  
 33. Alaimidae have been placed in Dorylaimea on the basis of the positions and orifices of the oesophageal glands and the amphidial apertures of some genera, and Enoplea on the basis of other characters. Molecular analyses consistently point to an affinity with Enoplea.  
 34. Terrestrial, predatory.  
 35. A very diverse group, paraphyletic on both molecular and morphological evidence (Holterman *et al.* 2006, Lorenzen 1994, Rusin *et al.* 2001), with part in Enoplea and part in Tripylea. Placed provisionally in Enoplica because this is assumed basal. Revision required.  
 36. Superfamily by Hodda (2007).  
 37. Marine, microbivorous.  
 38. Marine, microbivorous.  
 39. Marine, microbivorous.  
 40. Marine, microbivorous.  
 41. Unplaced in Hodda (2007). Placed as a superorder because affinities within Enoplia are still uncertain, but it falls within a broadened definition of the subclass.  
 42. Superfamily by Hodda (2007).  
 43. Marine, deep sea, mouthless, so trophic status uncertain, but seem to rely on prokaryotic organisms in their mid-gut (Tchesunov 1997).  
 44. Predatory, marine.  
 45. Placed as a separate class by Hodda (2007), on the basis of the morphological apomorphy of the spermatozoa having a nuclear envelope present (Yushin *et al.* 2002). Supported as a distinct clade, but with relationships on molecular evidence either unresolved (Meldal *et al.* 2007) or with affinities to Tripylida (Holterman *et al.* 2006) or Enoplia (Litvaitis *et al.* 2000, Van Megen *et al.* 2009), and on morphological evidence with affinities to both Tripylida and Enoplida.  
 46. Superfamily by De Coninck (1965).  
 47. Marine, predatory.  
 48. Marine, predatory.  
 49. Triplonchia was placed as the only subclass in Class Tripylea in previous classifications (Hodda 2007), on the basis of ambiguous morphological evidence, and weak (55-66%) or low molecular support for the dichotomous division of Nematoda into Enoplea and Chromadorea (Holterman *et al.* 2006, Meldal *et al.* 2006, Smythe *et al.* 2006), making a polytomy of Enoplea, Chromadorea, Tripylea, and Dorylaimea the only justified assumption. One species—*Tobrilus diversipapillatus*—has a gastrulation pattern highly common in animal kingdom, but uncommon in nematodes (Schierenberg 2005). Information on the patterns of gastrulation in other Triplonchia, Enoplea and Dorylaimea could potentially provide resolution for the early phylogeny of nematodes. In the absence of morphological or developmental evidence, recent molecular analyses show some affinities between the former Tripylea and the former Enoplea (Van Megen *et al.* 2009), so Tripylea is now placed as a subclass with the sole subclass of the former Enoplea in an enlarged class Enoplea.

- Suborder **Diphtherophorina** Coomans & Loof 1970 (2 superfamilies)
  - Superfamily **Diphtherophoroidea** Thorne 1935 (Clark 1961) (1 family)
    - Family **Diphtherophoridae** Thorne 1935 (3 genera, 50 species)<sup>51</sup>
  - Superfamily **Trichodoroidea** Clark 1961 (Siddiqi 1974) (1 family)
    - Family **Trichodoridae** Clark 1961 (5 genera, 99 species)<sup>52</sup>
- Order **Tripylida** Siddiqi 1983 (2 suborders)
  - Suborder **Tripylina** Andrassy 1974 (2 superfamilies)<sup>53</sup>
    - Superfamily **Tripyloidea** De Man 1876 (Clark 1961) (1 family)
      - Family **Tripylidae** De Man 1876 (2 subfamilies, 4 genera, 41 species)<sup>54,55</sup>
    - Superfamily **Tobriiloidea** Filipjev 1918 (De Coninck 1965) (4 families)
      - Family **Pandolaimidae** Belogurov 1980 (1 genus, 5 species)<sup>56</sup>
      - Family **Rhabdodemaniidae** Filipjev 1934 (1 genus, 17 species)<sup>57</sup>
      - Family **Tobrilidae** Filipjev 1918 (De Coninck 1965) (3 subfamilies, 10 genera, 162 species)<sup>58</sup>
      - Family **Triodontolaimidae** De Coninck 1965 (Lorenzen 1978) (1 subfamily, 1 genus, 1 species)<sup>59</sup>
  - Suborder **Prismatolaimina** n. rank (2 superfamilies)<sup>60</sup>
    - Superfamily **Onchuloidea** Andrassy 1964 (n. rank) (1 family)<sup>61</sup>
      - Family **Onchulidae** Andrassy 1964 (2 subfamilies, 8 genera, 20 species)<sup>62,63</sup>
    - Superfamily **Prismatolaimoidea** Gerlach & Riemann 1974 (Hodda 2007) (3 families)
      - Family **Bastianiidae** De Coninck 1935 (2 genera, 10 species)<sup>64,65</sup>
      - Family **Odontolaimidae** Gerlach & Riemann 1974 (Lorenzen 1981) (1 subfamily, 1 genus, 4 species)<sup>66</sup>
      - Family **Prismatolaimidae** Gerlach & Riemann 1974 (2 genera, 38 species)<sup>67,68</sup>

50. Cobb (1920) used the name *Triplonchia* as an order, but this pre-dates the adoption of uniform endings for the names of higher taxa, so is credited as the authority here. Siddiqi (1983) was the first to propose the name at order level in its current form.
51. Terrestrial, plant-root feeding, but damage not normally economically important.
52. Terrestrial, plant-root feeding. Many species are associated with transmission of viruses. Damage by many species, and their associated viruses, cause economically significant losses to crops.
53. Division of Tripylina into two clades is supported by molecular evidence (Meldal *et al.* 2006).
54. Most species are freshwater aquatic and predatory.
55. Freshwater aquatic, predatory or omnivorous or microbivorous.
56. Marine, omnivorous.
57. Terrestrial, microbivorous.
58. The family Tobrilidae may include the genus *Trischistoma* (Holterman & Holovachov 2007, Zullini 2006), but excluded here (Zhao 2011).
59. Subfamily created by De Coninck (1965).
60. Placed with Tobriiloidea by De Ley & Blaxter (2002). Some molecular analyses place the families Prismatolaimidae and Bastianiidae in a separate clade (Holterman *et al.* 2007, Van Megen *et al.* 2009), while others did not resolve their relationships (Meldal *et al.* 2006). None of the molecular analyses resolve the relationship of the families with Tobrilidae or Tripylidae. Morphological evidence has been interpreted as suggesting affinities with a number of different higher taxa. Recent analyses have suggested inclusion in Tripylida on the basis of the structure of the buccal cavity and cephalic sensillae (Hodda *et al.* 2004, Hodda 2007, Holovachov *et al.* 2008).
61. There is a unique structure of the oesophagus with gland cells interspersed with muscle, which defines the superfamily. Morphological similarities in the orifices of the oesophageal glands, cephalic sensillae, amphids and cardia support affinities with Prismatolaimidae (Hodda *et al.* 2004, Hodda 2007, Holovachov *et al.* 2008). Other interpretations include the family being totally unrelated to, closely related to, or a subset of, the Prismatolaimidae, and variously as belonging to the orders Trefusiida, Enoplida, Tripylida and Triplonchida (Goodey 1963, Andrassy 1964, De Coninck 1965, Riemann 1972, Andrassy 1976, Maggenti 1982, Siddiqi 1983, Maggenti 1991, Lorenzen 1994, Andrassy 2001a,b, De Ley & Blaxter 2002). Some authors have considered the evidence for higher systematics in this group inconclusive (Coomans & Raski 1988).
62. Hodda (2007) placed Onchulidae with Prismatolaimidae in Prismatolaimoidea, but with the inclusion of Bastianiidae with Prismatolaimidae in Prismatolaimoidea, continued inclusion of Onchulidae is no longer justified, so Onchulidae is placed in a new superfamily but with Prismatolaimoidea in a new suborder Prismatolaimina.
63. Terrestrial and freshwater aquatic, predatory.
64. Bastianiidae was family *incertae sedis* in the classifications of De Ley *et al.* (2006) and Hodda (2007). It has been included in Enoplida:Oxystominidae (Andrassy 1976), Tripylida:Prismatolaimidae (De Coninck 1935), Araeolaimida (Goodey 1963), and Chromadorida:Leptolaimina (Lorenzen 1994, Ryss 1988). The family was not included in some molecular analyses (Meldal *et al.* 2006, Smythe *et al.* 2006), but was resolved as a clade with Prismatolaimidae when it was included (Holterman *et al.* 2007, Van Megen *et al.* 2009). There are morphological similarities with Prismatolaimidae in the structure of the sensilla, amphid, cardia, supplements, spicules, spicular musculature, gubernaculum and organellum ovale (Coomans & Raski 1988, Holovachov 2006, Tchesunov & Sturhan 2002). The molecular and morphological evidence seems enough to place the family despite some evidence of other affinities.
65. Terrestrial, feeding habits unknown, probably microbivorous.
66. Freshwater aquatic or wet terrestrial habitats, microbivorous or algal feeding.
67. Subfamily created by Micoletzky (1922).
68. Terrestrial, microbivorous.



Class **Dorylaimea** Hodda 2007 (3 subclasses) <sup>69</sup>

Subclass **Bathyodontia** Hodda 2007 (2 superorders)

Superorder **Mononchica** Hodda 2007 (3 orders)

Order **Bathyodontida** Siddiqi 1983 (1 suborder) <sup>70</sup>

Suborder **Bathyodontina** Coomans & Loof 1970 (2 superfamilies)

Superfamily **Cryptonchoidea** Chitwood 1937 (2 families)

Family **Bathyodontidae** Clark 1961 (1 genus, 3 species) <sup>71</sup>

Family **Cryptonchidae** Chitwood 1937 (1 genus, 4 species)

Superfamily **Mononchuloidea** De Coninck 1965 (Coomans & Loof 1970) (1 family)

Family **Mononchulidae** De Coninck 1965 (Coomans & Loof 1970) (1 subfamily, 3 genera, 5 species) <sup>72,73</sup>

Order **Mermithida** Hyman 1951 (2 suborders)

Suborder **Aulolaimina** Hodda 2007 (2 superfamilies) <sup>74</sup>

Superfamily **Aulolaimoidea** Gerlach & Riemann 1973 (Hodda 2007) (1 family) <sup>75</sup>

Family **Aulolaimidae** Gerlach & Riemann 1973 (3 genera, 14 species) <sup>76,77</sup>

Superfamily **Isolaimioidea** Timm 1969 (1 family) <sup>78</sup>

Family **Isolaimiidae** Timm 1969 (1 genus, 11 species) <sup>79</sup>

Suborder **Mermithina** Andrassy 1971 (1 superfamily)

Superfamily **Mermithoidea** Braun 1883 (Wulker 1927) (2 families)

Family **Mermithidae** Braun 1883 (11 subfamilies, 102 genera, 599 species) <sup>80,81</sup>

Family **Tetradonematidae** Cobb 1919b (13 genera, 16 species) <sup>82</sup>

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69. Regarded as a subset of Enoplia by Lorenzen (1981) on the basis of the presence of primarily non-spiral amphids, the group is unresolved in most molecular phylogenies (Meldal *et al.* 2006, Litvaitis *et al.* 2000, Smythe *et al.* 2006). However, Dorylaimea is clearly a separate branch in the latest molecular analysis (Van Megen *et al.* 2009). This position is compatible with morphological analysis (Lorenzen 1981) if the assumed character polarity is reversed, and non-spiral amphids become plesiomorphic rather than apomorphic. All Orders within Dorylaimea have the morphological apomorphy of oesophageal glands opening behind the nerve ring. The clade has been advanced before on other morphological evidence (Maggenti 1991). Using morphological evidence requiring some assumptions regarding homology, but considering the vertebrate-parasitic Trichocephalida, Dioctophymatida, Muspiceida and Mermithida rather than the free-living members of the groups, Spratt (2011) regarded these groups as having shared characters of onchiostyles with Triplochida within Enoplea, and thus supporting Dorylaimia as a subclass within an expanded Enoplea. He also pointed out the presence of a Demanian system appears limited to Muspiceidae (both species of the genus *Maseria*) and 11 genera of Oncholaimida, suggesting further links between Trichocephalia and Enoplea. The clade of Dorylaimia is also supported by other molecular evidence, although it has been equivocally included within Enoplea (De Ley & Blaxter 2004) or Chromadorea (Holterman *et al.* 2006). Spermatogenesis and development provide further evidence for the separation of Dorylaimea from Enoplea and Chromadorea (Yushin & Malakhov 2004, Schierenberg & Lahl 2004). Herein the relation with Enoplea and Chromadorea is regarded as a polytomy (Aleshin *et al.* 1998, Hodda 2007).
70. Bathyodontida are equal in rank with Mononchida on the morphological grounds of the structure of the head and oesophagus (Coomans & Loof 1970). Molecular evidence also separates Bathyodontida from Mononchida (Holterman *et al.* 2006, Van Megen *et al.* 2009).
71. Terrestrial or freshwater aquatic, microbivorous.
72. Subfamily created by De Coninck (1965).
73. Terrestrial or freshwater aquatic, microbivorous.
74. Isolaimiidae placed with Mermithida on the basis of the tubules around the head, Isolaimiidae and Aulolaimidae are here placed together on the basis of molecular evidence (Van Megen *et al.* 2009). Morphologically, Aulolaimidae has been regarded as a separate family but with no apomorphy to justify any other placements within higher taxonomic ranks (Lorenzen 1981, 1994). Considering all evidence the family has been placed in Plectida (Haliplectoidea) and Plectia (De Ley & Blaxter 2004, Hodda 2007, respectively). Others considered the evidence inconclusive (Holovachov *et al.* 2007). With strong molecular support for affinities of Isolaimiidae and Aulolaimidae, the similarities in the head structure of Isolaimiidae and Mermithidae have added weight and justify placing Isolaimiidae and Aulolaimidae as a suborder within Mermithida.
75. Aulolaimidae has been placed with either Monhysterida or Plectida (Haliplectoidea) on molecular evidence (De Ley & Blaxter 2004, Holterman *et al.* 2006), but is unresolved in the latest molecular analysis (Van Megen *et al.* 2009). The family was placed within Enoplida (Ironoidea) or Plectida (Leptolaimina) on morphological grounds (Andrassy 1976, Lorenzen 1994). A polychotomy with Monhysterida and Plectida was therefore proposed, with consequent rank as a separate Order within the subclass Plectia (Hodda 2007).
76. Created as a subfamily by Jairajpuri & Hooper (1968).
77. Terrestrial, microbivorous.
78. Molecular evidence points to unresolved similarities of Isolaimioidea to Bathyodontia, Dorylaimida and Araeolaimida (De Ley & Blaxter 2004, Meldal *et al.* 2007, Holterman *et al.* 2006). Morphological evidence has been viewed as similarly inconclusive within the same group of phyla (Timm 1961, Theodorides 1965, De Coninck 1965). Isolaimina contains few, poorly-known species. It was regarded as a separate Order (Cobb 1919, Hodda 2007, Timm 1961), based on the apomorphy of 6 tubules around the head. As constituted in the present classification, Aulolaimina and Mermithida can accommodate the family on the basis of similarities in head structure and general body size. However, this placement is provisional and more investigation will be necessary to place the family with any certainty.
79. Terrestrial, microbivorous, rare.
80. Terrestrial, free-living but not feeding as adults and briefly as juveniles, internal parasites of arthropods for the rest of the life cycle. Uniformly fatal to the host.

- Order **Mononchida** Jairajpuri 1969 (1 suborder)  
 Suborder **Mononchina** Kirjanova & Krall 1969 (2 superfamilies)  
 Superfamily **Anatonchoidea** Jairajpuri 1969 (Jairajpuri 1971) (2 families)  
 Family **Anatonchidae** Jairajpuri 1969 (2 subfamilies, 9 genera, 180 species)<sup>83</sup>  
 Family **Iotonchidae** Jairajpuri 1969 (2 subfamilies, 11 genera, 127 species)<sup>84</sup>  
 Superfamily **Mononchoidea** Filipjev 1934 (Clark 1961) (3 families)  
 Family **Cobbonchidae** Jairajpuri 1969 (1 subfamily, 4 genera, 36 species)<sup>85</sup>  
 Family **Mononchidae** Filipjev 1934 (Chitwood 1937) (2 subfamilies, 8 genera, 97 species)<sup>86</sup>  
 Family **Mylonchulidae** Jairajpuri 1969 (2 subfamilies, 14 genera, 104 species)<sup>87</sup>  
 Subclass **Dorylaimia** Inglis 1983 (1 superorder)  
 Superorder **Dorylaimica** Hodda 2007 (1 order)  
 Order **Dorylaimida** Pearse 1942 (2 suborders)<sup>88</sup>  
 Suborder **Dorylaimina** Chitwood 1933 (5 superfamilies)<sup>89</sup>  
 Superfamily **Actinolaimoidea** Thorne 1939 (Thorne 1967) (3 families)  
 Family **Actinolaimidae** Thorne 1939 (Meyl 1957) (4 subfamilies, 14 genera, 125 species)<sup>90,91</sup>  
 Family **Carcharolaimidae** Thorne 1967 (2 subfamilies, 6 genera, 35 species)<sup>92 93</sup>  
 Family **Trachypleurosidae** Thorne 1967 (1 subfamily, 1 genus, 5 species)<sup>94</sup>  
 Superfamily **Belondiroidea** Thorne 1939 (Thorne 1964) (1 family)  
 Family **Belondiridae** Thorne 1939 (3 subfamilies, 25 genera, 252 species)<sup>95</sup>  
 Superfamily **Dorylaimoidea** De Man 1876 (Thorne 1934) (4 families)  
 Family **Aporcelaimidae** Heyns 1965 (3 subfamilies, 16 genera, 211 species)<sup>96</sup>  
 Family **Dorylaimidae** De Man 1876 (4 subfamilies, 23 genera, 446 species)<sup>97</sup>  
 Family **Nordiidae** Siddiqi 1969 (5 subfamilies, 22 genera, 215 species)<sup>98,99</sup>  
 Family **Qudsianematidae** Jairajpuri 1965a (Siddiqi 1969) (7 subfamilies, 47 genera, 469 species)<sup>100,101</sup>  
 Superfamily **Longidoroidea** Thorne 1935 (Khan & Ahmad 1975) (2 families)  
 Family **Longidoridae** Thorne 1935 (Meyl 1961) (2 subfamilies, 7 genera, 222 species)<sup>102,103</sup>  
 Family **Xiphinematidae** Dalmasso 1969 (Khan & Ahmad 1975) (1 subfamily, 1 genus, 230 species)<sup>104,105</sup>

81. The number of species in this family will vary enormously depending on the concepts of species, and standard of description required (Curran & Hominick 1981). The figure cited here is a maximum (Rubtsov 1978). The actual number of species described may be only one third this estimate, omitting many synonyms or descriptions that are inadequate to ever re-diagnose the species.
82. Terrestrial, internal parasites of arthropods, including as adults.
83. Terrestrial or freshwater aquatic, predatory.
84. Terrestrial or freshwater aquatic, predatory.
85. Terrestrial or freshwater aquatic, predatory, microbivorous or omnivorous.
86. Terrestrial or freshwater aquatic, predatory, microbivorous or omnivorous.
87. Terrestrial or freshwater aquatic, predatory.
88. Classification generally follows Jairajpuri & Ahmad (1992)
89. Created as suborder Dorylaimata by Chitwood (1933), which pre-dates the adoption of uniform endings for higher taxa, hence the authority is Chitwood 1933, although the first to use the name Dorylaimina was Pearse (1936).
90. Created as a subfamily by Thorne (1939).
91. Terrestrial or freshwater aquatic, predatory.
92. Terrestrial or freshwater aquatic, predatory.
93. Placed as a subfamily of Qudsianematidae by Andrassy (1991), but separated as a family in Actinolaimoidea by Jairajpuri & Ahmad (1992). Here placed in Actinolaimoidea because extensive sclerotization, thickening and elaboration of the cheilostome is apomorphic to the superfamily.
94. Terrestrial or freshwater aquatic, predatory.
95. Terrestrial, mostly plant-root feeding, but not economically important.
96. Terrestrial or freshwater aquatic, predatory or omnivorous.
97. Terrestrial or freshwater aquatic, algal-feeding or omnivorous.
98. Created as a subfamily by Jairajpuri & AH Siddiqi (1964).
99. Terrestrial or freshwater aquatic with a very few estuarine species, algal-feeding, omnivorous, microbivorous or predatory.
100. Created as a subfamily by Jairajpuri (1965a).
101. Terrestrial or freshwater aquatic, algal-feeding or omnivorous.
102. Terrestrial, plant-root feeding. Some species are associated with transmission of viruses. Damage by many species, and their associated viruses, cause economically significant losses to crops.
103. Subfamily created by Thorne (1935).
104. Subfamily created by Dalmasso (1969).

- Superfamily **Tylencholaimoidea** Filipjev 1934 (Ahmad & Jairajpuri 1983) (4 families)<sup>106</sup>  
 Family **Aulolaimoididae** Jairajpuri 1964 (4 genera, 15 species)<sup>107</sup>  
 Family **Leptonchidae** Thorne 1935 (6 subfamilies, 28 genera, 194 species)<sup>108</sup>  
 Family **Mydonomidae** Thorne 1964 (3 subfamilies, 14 genera, 116 species)<sup>109</sup>  
 Family **Tylencholaimidae** Filipjev 1934 (Siddiqi 1969) (4 subfamilies, 26 genera, 127 species)<sup>110,111</sup>
- Suborder **Nygolaimina** Ahmad & Jairajpuri 1979 (1 superfamily)  
 Superfamily **Nygolaimoidea** Thorne 1935 (De Coninck 1965) (4 families)  
 Family **Aetholaimidae** Jairajpuri 1965b (Ahmad & Jairajpuri 1982) (1 genus, 5 species)<sup>112,113</sup>  
 Family **Nygellidae** Andrassy 1958 (Jairajpuri 1964) (1 subfamily, 1 genus, 5 species)<sup>114</sup>  
 Family **Nygolaimellidae** Clark 1961 (Heyns 1968) (2 subfamilies, 3 genera, 10 species)<sup>115</sup>  
 Family **Nygolaimidae** Thorne 1935 (Meyl 1961) (2 subfamilies, 10 genera, 107 species)<sup>116</sup>
- Subclass **Trichocephalia** Hodda 2007 (1 superorder)  
 Superorder **Trichocephalica** Hodda 2007 (4 orders)  
 Order **Diectophymatida** Ryzhikov & Sonin 1981 (1 suborder)  
 Suborder **Diectophymatina** Chitwood 1933 (1 superfamily)<sup>117</sup>  
 Superfamily **Diectophymatoidea** Railliet 1915 (Roman 1965) (2 families)  
 Family **Diectophymatidae** Railliet 1915 (4 genera, 27 species)<sup>118</sup>  
 Family **Soboliphymatidae** Petrov 1930 (1 genus, 10 species)<sup>119</sup>
- Order **Marimermithida** Rubtzov 1980 (1 suborder)  
 Suborder **Marimermithina** Hodda 2007 (1 superfamily)  
 Superfamily **Marimermithoidea** Rubtzov & Platonova 1974 (Hodda 2007) (1 family)  
 Family **Marimermithidae** Rubtzov & Platonova 1974 (5 genera, 6 species)<sup>120</sup>
- Order **Muspiceida** (1 suborder)<sup>121</sup>  
 Suborder **Muspiceina** Bain & Chabaud 1968 (1 superfamily)  
 Superfamily **Muspiceioidea** Brumpt 1920 (Roman 1965) (2 families)  
 Family **Muspiceidae** Brumpt 1920 (5 genera, 8 species)<sup>122,123</sup>  
 Family **Robertdollfusiidae** Chabaud & Campana 1950 (4 genera, 6 species)<sup>124</sup>
- Order **Trichocephalida** Spasski 1954 (1 suborder)  
 Suborder **Trichinellina** Hodda 2007 (1 superfamily)  
 Superfamily **Trichinelloidea** Ward 1907 (Hall 1916) (6 families)  
 Family **Anatrichosomatidae** Yamaguti 1961 (1 genus, 5 species)<sup>125</sup>  
 Family **Capillariidae** Railliet 1915 (1 subfamily, 18 genera, 390 species)<sup>126</sup>

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105. Terrestrial, plant-root feeding. Some species are associated with transmission of viruses. Damage by many species, and their associated viruses, cause economically significant losses to crops.
106. Tylencholaiminae Filipjev 1934 has priority over Leptonchidae Thorne 1935 so is the correct name (Siddiqi 1982).
107. Terrestrial, plant-root feeding or omnivorous.
108. Terrestrial, plant-root feeding or omnivorous.
109. Terrestrial, plant-root feeding or omnivorous.
110. Subfamily created by Filipjev (1934).
111. Terrestrial or freshwater aquatic and one species estuarine, plant-root feeding or omnivorous.
112. Created as a subfamily by Jairajpuri (1965b).
113. Terrestrial, predatory or omnivorous.
114. Terrestrial, predatory or omnivorous.
115. Terrestrial, predatory or omnivorous.
116. Terrestrial or freshwater aquatic, predatory.
117. Created as suborder Diectophymata (Chitwood 1933), but ante-dating adoption of current uniform endings for names of higher ranks. First to use in current form was Clark (1961).
118. Internal parasites of mammals.
119. Internal parasites of mammals.
120. Immature stages parasitic in body cavity of marine benthic invertebrates, adults free-living but non-feeding.
121. Placed in this superorder on morphological evidence (Anderson & Bain 1982, Spratt & Nicholas 2002).
122. Originally described as a sub-family by Brumpt (1930).
123. Internal parasites of mammals.
124. Internal parasites of birds.
125. Internal parasites of mammals.
126. Internal parasites of mammals.

- Family **Cystoosidae** Skryabin 1923 (2 subfamilies, 2 genera, 7 species)<sup>127</sup>
- Family **Trichinellidae** Ward 1907 (4 genera, 16 species)<sup>128</sup>
- Family **Trichosomoididae** Hall 1916 (Yorke & Maplestone 1926) (2 subfamilies, 5 genera, 25 species)<sup>129</sup>
- Family **Trichuridae** Ransom 1911 (Railliet 1915) (1 subfamily, 6 genera, 107 species)<sup>130</sup>
- Class **Chromadorea** Inglis 1983 (2 subclasses)<sup>131</sup>
- Subclass **Chromadoria** Adamson 1987 (1 superorder)
- Superorder **Chromadorica** Hodda 2007 (3 orders)
- Order **Chromadorida** Chitwood 1933 (1 suborder)
- Suborder **Chromadorina** Filipjev 1929 (1 superfamily)
- Superfamily **Chromadoroidea** Filipjev 1917 (De Coninck & Schuurmans Stekhoven 1933) (5 families)
- Family **Achromadoridae** Gerlach & Riemann 1973 (Lorenzen 1981) (2 subfamilies, 3 genera, 26 species)<sup>132</sup>
- Family **Chromadoridae** Filipjev 1917 (5 subfamilies, 78 genera, 444 species)<sup>133</sup>
- Family **Cyatholaimidae** Filipjev 1918 (De Coninck & Schuurmans Stekhoven 1933) (2 subfamilies, 23 genera, 215 species)<sup>134</sup>
- Family **Ethmolaimidae** Lorenzen 1981 (1 subfamily, 4 genera, 84 species)<sup>135</sup>
- Family **Neotonchidae** Lorenzen 1981 (1 subfamily, 5 genera, 25 species)<sup>136</sup>
- Order **Desmodorida** De Coninck 1965 (1 suborder)<sup>137</sup>
- Suborder **Desmodorina** De Coninck 1965 (2 superfamilies)
- Superfamily **Desmodoroidea** Filipjev 1922 (Chitwood 1936) (3 families)
- Family **Desmodoridae** Filipjev 1922 (Steiner 1927) (6 subfamilies, 35 genera, 318 species)<sup>138</sup>
- Family **Draconematidae** Steiner 1930 (2 subfamilies, 15 genera, 82 species)<sup>139,140</sup>
- Family **Epsilonematidae** Steiner 1927 (2 subfamilies, 13 genera, 396 species)<sup>141</sup>
- Superfamily **Microlaimoidea** De Coninck & Schuurmans Stekhoven 1933 (Lorenzen 1981) (3 families)
- Family **Aponchiidae** Gerlach 1963 (2 genera, 12 species)<sup>142</sup>
- Family **Microlaimidae** De Coninck & Schuurmans Stekhoven 1933 (11 genera, 101 species)<sup>143</sup>
- Family **Monoposthiidae** De Coninck 1965 (4 genera, 33 species)<sup>144</sup>
- Order **Desmoscolecida** Filipjev 1929 (1 suborder)<sup>145</sup>
- Suborder **Desmoscolecina** De Coninck 1965 (1 superfamily)<sup>146</sup>

127. Internal or external parasites of fish or reptiles.

128. Internal parasites of mammals.

129. Internal parasites of mammals.

130. Internal parasites of mammals.

131. Spermatogenesis and development provide evidence for the separation of Chromadorea from Dorylaimia and Enoplea (Yushin & Malakhov 2004, Schierenberg & Lahl 2004).

132. Terrestrial or freshwater aquatic, microbivorous.

133. Overwhelmingly marine but with a few freshwater aquatic species, microbivorous.

134. Overwhelmingly marine but with a few freshwater aquatic species, microbivorous.

135. Overwhelmingly marine but with a few freshwater aquatic species, microbivorous.

136. Marine, microbivorous.

137. On all available evidence, regarded as a separate order (DeLey & Blaxter 2004, De Ley *et al.* 2006, Decraemer & Smol 2006, Hodda 2007), although molecular evidence has the group as a subset of Chromadorida (Van Megen *et al.* 2009) or grouped with Desmoscolecida (Litvaitis *et al.* 2000) or split among other groups (Holterman *et al.* 2006). Morphologically, it has been classified as a subset of Chromadorida (Lorenzen 1994), but this is compatible with the current classification if the Chromadorida of Lorenzen (1994) is here equivalent to superorder Chromadorica.

138. Overwhelmingly marine but with a few freshwater aquatic species, microbivorous.

139. Created as subfamily Draconematini by Filipjev (1918).

140. Marine, microbivorous.

141. Marine, microbivorous.

142. Marine, microbivorous.

143. Overwhelmingly marine but with a few freshwater aquatic species, microbivorous.

144. Overwhelmingly marine but with a few freshwater aquatic species, microbivorous.

145. Originally named order Desmoscolecata (Filipjev 1929) prior to adoption of current system of uniform endings of higher-ranked taxon names. First used in current form by De Coninck (1965).



Superfamily **Desmoscolecoidae** Shipley 1896 (Chitwood 1937) (3 families)  
 Family **Cyartonomatidae** Tchesunov 1990 (1 subfamily, 9 genera, 35 species)<sup>147</sup>  
 Family **Desmoscolecidae** Shipley 1896 (2 subfamilies, 10 genera, 136 species)<sup>148</sup>  
 Family **Meyliidae** De Coninck 1965 (2 subfamilies, 15 genera, 157 species)<sup>149</sup>  
 Order **Selachinematida** n. rank (1 suborder)  
 Suborder **Selachinematina** n. rank (1 superfamily)  
 Superfamily **Selachinematoidae** De Coninck 1965 (Hodda 2007) (4 families)<sup>150</sup>  
 Family **Choanolaimidae** De Coninck 1965 (6 genera, 46 species)<sup>151,152</sup>  
 Family **Choniolaimidae** De Coninck & Schuurmans Stekhoven 1933 (1 genus, 5 species)<sup>153,154</sup>  
 Family **Richtersiidae** Kreis 1929 (De Coninck 1965) (2 genera, 21 species)<sup>155,156</sup>  
 Family **Selachinematidae** De Coninck 1965 (7 genera, 38 species)<sup>157,158</sup>  
 Subclass **Plectia** Hodda 2007 (4 superorders)<sup>159</sup>  
 Superorder **Monhysterica** Hodda 2007 (1 order)  
 Order **Monhysterida** Filipjev 1929 (3 suborders)<sup>160</sup>  
 Suborder **Araeolaimina** De Coninck 1965 (1 superfamily)  
 Superfamily **Axonolaimoidea** De Coninck & Schuurmans Stekhoven 1933 (Chitwood 1937) (5 families)  
 Family **Axonolaimidae** De Coninck & Schuurmans Stekhoven 1933 (13 genera, 2 subgenera, 124 species)<sup>161</sup>  
 Family **Bodonematidae** Jensen 1991 (1 genus, 1 species)  
 Family **Comesomatidae** Filipjev 1918 (De Coninck & Schuurmans Stekhoven 1933) (3 subfamilies, 23 genera, 173 species)<sup>162,163</sup>  
 Family **Coninckiiidae** Lorenzen 1981 (1 genus, 5 species)<sup>164</sup>

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146. Originally named suborder Desmoscolecata (Chitwood 1933) prior to adoption of current system of uniform endings of higher-ranked taxon names. First used in current form by De Coninck (1965).
147. Marine, microbivorous.
148. Overwhelmingly marine but with a few freshwater aquatic species, microbivorous.
149. Marine, microbivorous.
150. In molecular phylogenies, this group is either not represented (Meldal *et al.* 2007), unresolved (Holterman *et al.* 2006, Van Megen *et al.* 2009) or placed within Chromadorina (De Ley & Blaxter 2004). In morphological phylogenies, the group is either within the Chromadorina (Filipjev 1934, Lorenzen 1994), a sister group to Chromadorina within an expanded Chromadorida (Maggenti 1991), or within the Desmodorida (Chitwood & Chitwood 1950, De Coninck 1965, Gerlach & Riemann 1973, 1974). There are a number of seemingly unique morphological features in the group, such as the structure of the buccal cavity, the staining characteristics of the cuticle, the jointed structure of cephalic setae, and large intestinal cells (Filipjev 1934, Gerlach 1964, Lorenzen 1994). These morphological features, combined with the unresolved position in molecular analyses (Holterman *et al.* 2006, Van Megen *et al.* 2009), imply that the relationships with Chromadorida and Desmodorida must be viewed currently as a polytomy. Hence the group is afforded Order status equivalent to Chromadorida and Desmodorida.
151. Although the families Selachinematidae, Richtersiidae, Choniolaimidae and Choanolaimidae have been synonymized (Gerlach 1964, Lorenzen 1981), there remain many significant differences (Gerlach 1964). Given the possible nature of the Selachinematida as a distinct clade, these differences seem to justify regarding the differences as justifying family status. A revision of the entire Selachinematida is needed.
152. Marine or estuarine, predatory.
153. Although the families Selachinematidae, Richtersiidae, Choniolaimidae and Choanolaimidae have been synonymized (Gerlach 1964, Lorenzen 1981), there remain many significant differences (Gerlach 1964). Given the possible nature of the Selachinematida as a distinct clade, these differences seem to justify regarding the differences as justifying family status. A revision of the entire Selachinematida is needed.
154. Marine or estuarine, predatory.
155. Although the families Selachinematidae, Richtersiidae, Choniolaimidae and Choanolaimidae have been synonymized (Gerlach 1964, Lorenzen 1981), there remain many significant differences (Gerlach 1964). Given the possible nature of the Selachinematida as a distinct clade, these differences seem to justify regarding the differences as justifying family status. A revision of the entire Selachinematida is needed.
156. Marine or estuarine, microbivorous.
157. Although the families Selachinematidae, Richtersiidae, Choniolaimidae and Choanolaimidae have been synonymized (Gerlach 1964, Lorenzen 1981), there remain many significant differences (Gerlach 1964). Given the possible nature of the Selachinematida as a distinct clade, these differences seem to justify regarding the differences as justifying family status. A revision of the entire Selachinematida is needed.
158. Marine, microbivorous or predatory.
159. Plectia are separated from Chromadoria on the basis of spermatogenesis (Yushin & Malakhov 2004).
160. Filipjev (1929) used the name Monhysterata as an order, but this pre-dates the adoption of uniform endings for the names of higher taxa, so is credited as the authority here. De Coninck (1965) was the first to propose the name at order level in its current form.
161. Marine, microbivorous.
162. Originally cited as Family Comesomatidae (De Coninck & Schuurmans Stekhoven 1933). Placed here on the basis of molecular evidence from 2 genes and several analyses (Holterman *et al.* 2006, Meldal *et al.* 2007, Litvaitis *et al.* 2000, Van Megen *et al.* 2009). There is morphological evidence for inclusion in Monhysterida, and monophyly of the family, but not subfamily or superfamily placement (Lorenzen 1994).
163. Marine, microbivorous.
164. Marine, microbivorous.

- Family **Diplopeltidae** Filipjev 1918 (De Coninck & Schuurmans Stekhoven 1933) (2 subfamilies, 15 genera, 118 species)
- Suborder **Linhomoeina** Andrassy 1974 (1 superfamily)
- Superfamily **Siphonolaimoidea** Chitwood 1937 (De Coninck 1965) (3 families)
- Family **Fusivermidae** Tchesunov 1996 (1 genus, 1 species)<sup>165</sup>
- Family **Linhomoeidae** Filipjev 1922 (Filipjev 1934) (3 subfamilies, 27 genera, 2 subgenera, 216 species)<sup>166</sup>
- Family **Siphonolaimidae** Chitwood 1937 (2 subfamilies, 4 genera, 29 species)<sup>167</sup>
- Suborder **Monhysterina** De Coninck & Schuurmans Stekhoven 1933 (2 superfamilies)
- Superfamily **Monhysteroidea** De Man 1876 (De Coninck 1965) (1 family)
- Family **Monhysteridae** De Man 1876 (17 genera, 244 species)<sup>168</sup>
- Superfamily **Sphaerolaimoidea** Filipjev 1918 (De Coninck 1965) (2 families)
- Family **Sphaerolaimidae** Filipjev 1918 (De Coninck & Schuurmans Stekhoven 1933) (2 subfamilies, 6 genera, 61 species)<sup>169</sup>
- Family **Xyalidae** Chitwood 1951 (Lorenzen 1977) (3 subfamilies, 48 genera, 5 subgenera, 467 species)<sup>170</sup>
- Superorder **Plectica** Hodda 2007 (3 orders)
- Order **Benthimermithida** Tchesunov 1997 (1 suborder)<sup>171</sup>
- Suborder **Benthimermithina** Hodda 2007 (1 superfamily)
- Superfamily **Benthimermithoidea** Petter 1980 (Hodda 2007) (1 family)
- Family **Benthimermithidae** Petter 1980 (3 genera, 33 species)<sup>172</sup>
- Order **Leptolaimida** Hodda 2007 (1 suborder)
- Suborder **Leptolaimina** Lorenzen 1981 (2 superfamilies)
- Superfamily **Ceramonematoidea** Cobb 1933 (De Coninck 1965) (3 families)
- Family **Ceramonematidae** Cobb 1933 (Schuurmans Stekhoven 1942) (2 subfamilies, 8 genera, 58 species)<sup>173,174</sup>
- Family **Tarvaidae** Lorenzen 1981 (1 subfamily, 1 genus, 8 species)<sup>175</sup>
- Family **Tubolaimoididae** Lorenzen 1981 (1 subfamily, 2 genera, 4 species)<sup>176</sup>
- Superfamily **Leptolaimoidea** Oerley 1880 (De Coninck 1965) (8 families)
- Family **Aegialolaimidae** Lorenzen 1981 (1 subfamily, 2 genera, 11 species)<sup>177</sup>
- Family **Aphanolaimidae** Chitwood 1936 (Holovachov *et al.* 2002) (2 subfamilies, 4 genera, 67 species)
- Family **Diplopeltoididae** Tchesunov 1990 (1 subfamily, 1 genus, 5 species)<sup>178</sup>
- Family **Leptolaimidae** Oerley 1880 (3 subfamilies, 15 genera, 82 species)<sup>179</sup>
- Family **Ohridiidae** Lorenzen 1981 (1 subfamily, 2 genera, 9 species)<sup>180</sup>
- Family **Paramicrolaimidae** Lorenzen 1981 (1 subfamily, 1 genus, 5 species)<sup>181</sup>

165. Marine, microbivorous.

166. Overwhelmingly marine or estuarine but with a few freshwater aquatic species, microbivorous.

167. Marine or estuarine, microbivorous.

168. Mostly marine with many species in freshwater aquatic habitats and a few terrestrial species, microbivorous. Three genera living in gill chambers of freshwater aquatic or terrestrial crustaceans.

169. Freshwater aquatic or brackish waters, microbivorous.

170. Mostly marine but with some freshwater aquatic species, microbivorous.

171. Benthimermithida was unplaced in previous classifications (De Ley & Blaxter 2004, De Ley *et al.* 2006, Hodda 2007). Morphological evidence of phylogeny is unclear. Molecular evidence is lacking. Provisionally placed in Plectica on the basis of some similarity to Camacolaimus (Tchesunov 1997, Miljutin 2006).

172. Immature stages parasitic in body cavity of marine benthic invertebrates (*nematodes, polychaetes, priapulids, crustacea* and *holothuroids*), adults free-living but non-feeding.

173. Morphological affinities with Tarvaidae and Diplopeltoididae (Tchesunov & Miljutina 2002). Created as a subfamily by Cobb (1933).

174. Marine, microbivorous.

175. Marine, microbivorous.

176. Marine, microbivorous.

177. Marine, microbivorous.

178. Marine, microbivorous.

179. Mostly marine but some freshwater aquatic and terrestrial species, microbivorous.

180. Marine, freshwater aquatic and terrestrial, free-living microbivorous or parasitic in terrestrial oligochaetes, benthic invertebrates and foraminifera (Holovachov & De Ley 2006, Hope & Tchesunov 1999, Miljutin 2006).

- Family **Rhadinematidae** Lorenzen 1981 (1 subfamily, 1 genus, 1 species)<sup>182</sup>
- Order **Plectida** Malakhov *et al.* 1982 (1 suborder)
- Superfamily **Haliplectoidea** De Coninck 1965 (Andrassy 1974) (2 families)
- Superfamily **Plectoidea** Oerley 1880 (Chitwood 1937) (4 families)
- Family **Haliplectidae** Chitwood 1951 (De Coninck 1965) (3 genera, 24 species)<sup>183,184</sup>
- Family **Peresianidae** Vitiello & De Coninck 1968 (Lorenzen 1981) (1 genus, 3 species)<sup>185,186</sup>
- Suborder **Plectina** Malakhov *et al.* 1982 (2 superfamilies)
- Family **Camacolaimidae** De Coninck & Schuurmans Stekhoven 1933 (14 genera, 65 species)<sup>187,188</sup>
- Family **Chronogasteridae** Gagarin 1975 (4 genera, 50 species)<sup>189,190</sup>
- Family **Metateratocephalidae** Eroshenko 1973 (2 genera, 9 species)<sup>191,192</sup>
- Family **Plectidae** Oerley 1880 (3 subfamilies, 12 genera, 140 species)<sup>193</sup>
- Superorder **Rhabditica** Hodda 2007 (5 orders)
- Order **Diplogasterida** Inglis 1983 (4 suborders)
- Suborder **Chambersiellina** Hodda 2007 (1 superfamily)<sup>194</sup>
- Superfamily **Chambersielloidea** Thorne 1937 (Hodda 2007) (1 family)
- Family **Chambersiellidae** Thorne 1937 (Sanwal 1957) (2 subfamilies, 7 genera, 16 species)<sup>195</sup>
- Suborder **Diplogasterina** Paramonov 1952 (2 superfamilies)<sup>196</sup>
- Superfamily **Cylindrocorporoidea** T. Goodey 1939 (Andrassy 1976) (1 family)
- Family **Cylindrocorporidae** T. Goodey 1939 (3 genera, 22 species)<sup>197,198</sup>
- Family **Odontopharyngidae** Micoletzky 1922 (1 genus, 2 species)
- Superfamily **Diplogasteroidea** Micoletzky 1922 (Goodey 1963) (6 families)
- Family **Cephalobiidae** Travassos & Kloss 1960a (2 subfamilies, 6 genera, 30 species)<sup>199</sup>
- Family **Diplogasteridae** Micoletzky 1922 (Steiner 1929) (1 subfamily, 15 genera, 239 species)<sup>200,201</sup>

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181. Marine, microbivorous.
182. Marine, microbivorous.
183. Subfamily created by Chitwood (1951).
184. Marine, microbivorous.
185. Subfamily created by Vitiello & De Coninck (1968).
186. Marine, microbivorous.
187. Camacolaiminae was regarded as a subfamily of Leptolaimidae by Lorenzen (1994), but there was no morphological apomorphy to justify this placement. Molecular evidence suggests affinities with Plecoitoidea, so it is placed there (Van Megen *et al.* 2009).
188. Marine or freshwater aquatic or moist terrestrial habitats, microbivorous.
189. There is ongoing controversy over the rendering of names ending in "gaster" with a suffix. See note Suborder Diplogasterina Paramonov 1952 (2 superfamilies) : cited as either Chronogastridae (Siddiqi 2003, Holovachov 2004, Mountport 2005, Holovachov & De Ley 2006), or Chronogasteridae (Ettema *et al.* 2000, Gagarin 1993, Gagarin *et al.* 2003, Hodda 2003, 2007, Lorenzen 1981, Poinar & Sarbu 1994, Zullini *et al.* 2002).
190. Freshwater aquatic or terrestrial, microbivorous.
191. Metateratocephalidae (including the genera *Metateratocephalus* and *Euteratocephalus*) have been included in Teratocephalidae on morphological grounds (Lorenzen 1981, 1994). Other morphological evidence (Bostrom 1989) and molecular studies (Holtermann *et al.* 2006, Van Megen *et al.* 2009) have indicated separate evolutionary paths.
192. Freshwater aquatic or moist terrestrial habitats, microbivorous.
193. Terrestrial or freshwater aquatic or marine, microbivorous. Some species associated with arthropods as commensals.
194. On morphological evidence the family has been placed as unresolved in Rhabditia (Lorenzen 1994). On molecular evidence, the family has been unresolved within Diplogasterida (De Ley & Blaxter 2004). More research is clearly needed to place the few species in the family, superfamily and suborder into anything other than a separate suborder under Diplogasterida, equivalent in rank to Myolaimina (Goodey 1963).
195. Terrestrial, microbivorous.
196. There is controversy over the correct rendering of names based on the genus name *Diplogaster*, resting on formation of Latin adjectives and the form of nouns (Sudhaus & von Lieven 2003). The original use as a suborder was the form *Diplogasterata* n. subord (Paramonov 1952). Here, the most frequently used form is adopted. The position of the (well-defined) suborder was unresolved within Rhabditica on molecular evidence (Holtermann *et al.* 2006, Meldal *et al.* 2007, Van Megen *et al.* 2009), but sometimes placed within Rhabditida (De Ley & Blaxter 2004). A separate clade of equal rank to Rhabditina and Tylenchina on morphological evidence (Lorenzen 1994).
197. Included in Rhabditida by Hodda (2007), placed in Diplogasterida on molecular evidence (Van Megen *et al.* 2009), the evidence for morphological placement has long been in doubt.
198. Terrestrial, microbivores or fungivores. Associated with insects. or rarely in mammal or reptile.
199. Internal parasites of insects.
200. Created as a subfamily by Micoletzky (1922).
201. Terrestrial, microbivorous or omnivorous or predatory. Often associated with invertebrates, and may be parasitic internally with value as biocontrol agents.

- Family **Diplogasteroididae** Paramonov 1952 (3 genera, 40 species)<sup>202</sup>
- Family **Neodiplogasteridae** Paramonov 1952 (Andrassy 1984) (1 subfamily, 2 genera, 10 species)<sup>203,204</sup>
- Family **Pseudodiplogasteroididae** De Ley & Blaxter 2002 (1 genus, 2 species)<sup>205,206</sup>
- Family **Tylopharyngidae** Filipjev 1918 (n. rank.) (1 subfamily, 2 genera, 3 species)
- Suborder **Myolaimina** Inglis 1983 (2 superfamilies)<sup>207</sup>
- Superfamily **Carabonematoidea** Stammer & Wacheck 1952 (Hodda 2007) (1 family)
- Family **Carabonematidae** Stammer & Wacheck 1952 (1 genus, 1 species)<sup>208,209</sup>
- Superfamily **Myolaimoidea** Goodey 1963 (Hodda 2007) (1 family)
- Family **Myolaimidae** Goodey 1963 (4 genera, 22 species)<sup>210</sup>
- Order **Drilonematida** n. rank (1 suborder)
- Suborder **Drilonematina** n. rank (1 superfamily)
- Superfamily **Drilonematoidea** Pierantoni 1916 (Chitwood 1950) (5 families)
- Family **Creagrocercidae** Baylis 1943 (1 genus, 1 species)<sup>211</sup>
- Family **Drilonematidae** Pierantoni 1916 (6 subfamilies, 16 genera, 56 species)<sup>212,213</sup>
- Family **Homungellidae** Timm 1966 (2 genera, 12 species)<sup>214</sup>
- Family **Mesidionematidae** Poinar 1978 (2 genera, 6 species)<sup>215</sup>
- Family **Pharyngonematidae** Chitwood 1950 (Timm 1959) (1 subfamily, 3 genera, 4 species)<sup>216,217</sup>
- Family **Scoleophilidae** Baylis 1943 (1 genus, 3 species)<sup>218</sup>
- Family **Ungellidae** Chitwood 1950 (2 subfamilies, 13 genera, 69 species)<sup>219</sup>
- Order **Panagrolaimida** Hodda 2007 (4 suborders)<sup>220</sup>
- Suborder **Aphelenchina** Geraert 1966 (3 superfamilies)<sup>221</sup>
- Superfamily **Aphelenchoidea** Fuchs 1937 (Thorne 1949) (1 family)

202. Terrestrial, microbivorous or omnivorous or predatory. Often associated with arthropods.

203. Created as a subfamily by Paramonov (1952).

204. Terrestrial, microbivorous or predatory.

205. Created as a subfamily by Koerner (1954).

206. Terrestrial, microbivorous or omnivorous. Associated with beetles, but not parasitic.

207. Affinities with Diplogasterida were suggested by most molecular analyses (De Ley & Blaxter 2004, Holterman *et al.* 2006, Meldal *et al.* 2007), except where Myolaimidae was unresolved in the latest molecular analysis (Baerman *et al.* 2009, Van Megen *et al.* 2009). Morphologically, affinities with Rhabditida have been suggested also (Goodey 1963).

208. Molecular evidence of phylogeny of Carabonematidae is lacking (De Ley & Blaxter 2004, Van Megen *et al.* 2009). The position of the family is either unresolved within Rhabditina on morphological evidence (Stammer & Wacheck 1952) or within Myolaimina (Inglis 1983). The family contains few, poorly-known species, and more investigation is required.

209. Parasites of beetles.

210. Terrestrial, microbivorous.

211. Internal parasites of terrestrial annelids.

212. Created as family Drilonemidae by Pierantoni (1916).

213. Internal parasites of terrestrial annelids.

214. Internal parasites of terrestrial annelids.

215. Internal parasites of terrestrial annelids.

216. Created as a subfamily by Chitwood 1950.

217. Internal parasites of terrestrial annelids.

218. Internal parasites of terrestrial annelids.

219. Internal parasites of terrestrial annelids.

220. Spermatogenesis and development provide evidence for the separation of Spirurida, Rhabditida and Panagrolaimida (Yushin & Malakhov 2004, Schierenberg & Lahl 2004).

221. Hodda (2007) considered the Superfamilies Aphelenchoidea and Aphelenchoidea as belonging to the different suborders Panagrolaimina and Tylenchina, respectively, because of consistent differentiation with support on molecular evidence (De Ley & Blaxter 2004, Holterman *et al.* 2006, Meldal *et al.* 2006, Smythe *et al.* 2006). The most recent molecular evidence resolved the superfamilies into different clades with statistical support, but did not show closer affinities to either Panagrolaimina or Tylenchina (Van Megen *et al.* 2009). De Ley & Blaxter (2002), and De Ley *et al.* (2006), despite the clear molecular evidence, as well as morphological differences, considered the morphological similarities most important and put the two groups together (as families Aphelenchidae and Aphelenchoididae) in infraorder Tylenchomorpha (= suborder Tylenchina in the current classification). Here the superfamilies are regarded as separate, based on both the molecular evidence and morphology. Morphological differences include most notably the development of the posterior oesophagus, the presence or absence of bursae and gubernacula, as well as other features. The present classification reflects the morphological differences as being apomorphies within Aphelenchina defining the superfamilies. but the superfamilies are together regarded as a suborder on the basis of the long-noticed morphological apomorphies, most prominently the form of the median oesophageal bulb and the position of the oesophageal gland orifices (Hunt 1993, Geraert 1966, Thorne 1949). The suborder reflects the differentiation of both superfamilies from Panagrolaimina and Tylenchina.



Family **Aphelenchidae** Fuchs 1937 (Steiner 1949) (1 subfamily, 1 genus, 27 species)<sup>222,223</sup>  
 Superfamily **Aphelenchoidea** Skarbilovich 1947 (Siddiqi 1980) (7 families)  
 Family **Acugutturidae** Hunt 1980 (Hunt 1993) (2 subfamilies, 3 genera, 5 species)<sup>224</sup>  
 Family **Aphelenchoididae** Skarbilovich 1947 (Paramonov 1953) (2 subfamilies, 10 genera, 213 species)<sup>225,226</sup>  
 Family **Berntsenidae** Hodda 2003 (1 genus, 2 species)<sup>227</sup>  
 Family **Ektaphelenchidae** Paramonov 1964 (1 subfamily, 4 genera, 57 species)<sup>228</sup>  
 Family **Entaphelenchidae** Nickle 1970 (1 subfamily, 4 genera, 10 species)<sup>229</sup>  
 Family **Parasitaphelenchidae** Ruehm 1956 (Siddiqi 1980) (2 subfamilies, 3 genera, 113 species)<sup>230,231</sup>  
 Family **Seinuridae** Husain & Khan 1967a (Baranovskaya 1981) (1 subfamily, 4 genera, 52 species)<sup>232,233</sup>  
 Superfamily **Paraphelenchoidea** T. Goodey 1951 (Hodda 2007) (1 family)  
 Family **Paraphelenchidae** T. Goodey 1951 (J.B. Goodey 1960) (1 subfamily, 1 genus, 24 species)<sup>234,235</sup>  
 Suborder **Cephalobina** Andrassy 1974 (1 superfamily)<sup>236,237</sup>  
 Superfamily **Cephalobidea** Filipjev 1934 (Fuchs 1934) (6 families)  
 Family **Alirhabditidae** Suryawanshi 1971 (1 genus, 2 species)<sup>238</sup>  
 Family **Bicirronematidae** Andrassy 1978 (Holovachov *et al.* 2003) (1 subfamily, 2 genera, 5 species)<sup>239,240</sup>  
 Family **Cephalobidae** Filipjev 1934 (Chitwood & MacIntosh 1934) (2 subfamilies, 32 genera, 3 subgenera, 227 species)<sup>241,242</sup>  
 Family **Elaphonematidae** Heyns 1962a (Paramonov 1964) (1 subfamily, 3 genera, 9 species)<sup>243</sup>  
 Family **Metacrobelidae** Andrassy 1974 (1 genus, 3 species)<sup>244,245</sup>

222. Created as a subfamily by Fuchs (1937).
223. Terrestrial, fungivorous. Sometimes associated with plant damage.
224. External parasites of arthropods.
225. Created as a subfamily by Skarbilovich (1947).
226. Terrestrial, fungivores or plant-feeding above or below ground or predators. Some plant-feeding species cause economically significant damage. Some species are internal parasites of insects.
227. Associated externally with beetles.
228. External parasites of arthropods.
229. Internal parasites of arthropods.
230. Created as a subfamily by Ruehm (1956).
231. Terrestrial, fungivores or plant-feeding above or below ground. Some species cause economically significant damage. Some species are associated with insects as vectors.
232. Created as a subfamily by Husain & Khan (1967a).
233. Terrestrial, predatory.
234. Created as a subfamily by T Goodey (1951). Paraphelenchidae are different from Apelecheidae in many of the same features used to separate Aphelenchoididae from Aphelenchidae. Hence the differences may reflect a deep divergence. Paraphelenchidae share a number of features with Tylenchidae, such as an oesophageal isthmus with nerve ring around it, oesophageal glands enclosed in a bulb, vulva a transverse slit, and cephalated spicules. Paraphelenchidae differ from Tylenchidae in the major characters: location of oesophageal gland orifices, development of median oesophageal bulb, formation of stylet, genital papillae and the presence of a bursa, plus others. Thus Paraphelenchidae differ from Aphelenchidae in similar features as those differentiating other superfamilies within Tylenchina. Hence Paraphelenchoidea may represent a unique line of evolution within Tylenchina, and it is afforded superfamily status, even though some molecular data show Paraphelenchidae form a clade with Aphelenchidae (Van Megen *et al.* 2009).
235. Terrestrial, fungivorous.
236. Cephalobina and Rhabditina have been traditionally placed together in an Order Rhabditida. Molecular evidence consistently places the Cephalobina with Panagrolaimina (De Ley & Blaxter 2004, Holterman *et al.* 2006, Meldal *et al.* 2007, Van Megen *et al.* 2009). In addition, it appears that the origin of nerve cells in the oesophagus may be different in Rhabditidae to that in Cephalobidae and Panagrolaimidae (Borgonie *et al.* 2000). Early development is also different in *Caenorhabditis elegans* (Rhabditida) and *Acroboloides nanus* (Cephalobina) (Schierenberg 2000). The monophyly of the Cephalobina is supported on molecular evidence (Nadler *et al.* 2006).
237. Created as an Infraorder by De Ley & Blaxter 2002.
238. Terrestrial, microbivorous.
239. Created as a subfamily by Andrassy (1978).
240. Terrestrial, microbivorous.
241. Created as subfamily by Artigas (1929) in a thesis, and Filipjev (1934).
242. Terrestrial, microbivorous.
243. Associates of terrestrial annelids.
244. Created as a subfamily by Paramonov (1964).
245. Terrestrial, microbivorous.

Family **Osstellidae** Heyns 1962b (Andrassy 1984) (4 genera, 13 species)<sup>246,247</sup>

Suborder **Panagrolaimina** Hodda 2007 (5 superfamilies)

Superfamily **Alloionematoidea** Chitwood & MacIntosh 1934 (Andrassy 1983) (1 family)

Family **Alloionematidae** Chitwood & MacIntosh 1934 (Poinar 1977) (1 subfamily, 4 genera, 6 species)<sup>248,249</sup>

Superfamily **Myenchoidea** Pereira 1931 (Poinar 1977) (1 family)

Family **Myenchidae** Pereira 1931 (Poinar 1977) (1 subfamily, 2 genera, 3 species)<sup>250,251</sup>

Superfamily **Panagrolaimoidea** Thorne 1937 (Andrassy 1976) (1 family)

Family **Panagrolaimidae** Thorne 1937 (Paramonov 1956) (4 subfamilies, 16 genera, 1 subgenus, 54 species)<sup>252,253</sup>

Superfamily **Steinernematoidea** Chitwood & Chitwood 1937 (Hodda 2007) (1 family)

Family **Steinernematidae** Chitwood & Chitwood 1937 (2 genera, 78 species)<sup>254</sup>

Superfamily **Strongyloidea** Chitwood & MacIntosh 1934 (De Ley & Blaxter 2002) (2 families)

Family **Strongyloidae** Chitwood & MacIntosh 1934 (3 genera, 70 species)<sup>255</sup>

Family **Rhabdiasidae** Railliet 1916 (6 genera, 76 species)<sup>256</sup>

Suborder **Tylenchina** Chitwood 1950 (4 superfamilies)

Superfamily **Anguinoidea** Nicoll 1935 (2 families)<sup>257,258</sup>

Family **Anguinidae** Nicoll 1935 (Siddiqi 1971) (2 subfamilies, 14 genera, 187 species)<sup>259</sup>

Family **Sychnotylenchidae** Paramonov 1967 (Golden 1971) (1 subfamily, 2 genera, 30 species)<sup>260,261</sup>

Superfamily **Criconematoidea** Taylor 1936 (Geraert 1966) (5 families)

Family **Criconematidae** Taylor 1936 (Thorne 1949) (5 subfamilies, 16 genera, 9 subgenera, 426 species)<sup>262,263,264</sup>

Family **Hemicyclophoridae** Skarbilovich 1959 (Geraert 1966) (1 subfamily, 2 tribes, 6 genera, 155 species)<sup>265,266</sup>

Family **Paratylenchidae** Thorne 1949 (Raski 1962) (1 subfamily, 3 genera, 2 subgenera, 131 species)<sup>267,268</sup>

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246. Subfamily Osstellinae created by Heyns (1962a), and used as a family by De Ley & Coomans (1990), but Drilocephalobidae was used first at family level (Ali, Suryawanshi & Chisti, 1973).
247. Terrestrial, microbivorous.
248. Created as a subfamily by Chitwood & MacIntosh (1934).
249. Terrestrial, microbivorous, may be associated with invertebrates as internal or external parasites.
250. Created as a subfamily by Pereira (1931).
251. Internal parasites of hirudoid annelids or frogs.
252. Created as a subfamily by Thorne (1937).
253. Terrestrial, microbivorous, may be associated with invertebrates as internal or external parasites.
254. Terrestrial, microbivorous, internal parasites of arthropods used as biocontrol agents.
255. Internal parasites of vertebrates.
256. Internal parasites of amphibians or reptiles.
257. Whether the Anguinoidea have closer affinities to Tylenchoidea or Sphaerularioidea has been discussed for some time based on morphological and life history evidence (Siddiqi 1986, 2000). Molecular evidence does not resolve the issue unequivocally (Meldal *et al.* 2007, Holterman *et al.* 2006, Van Megen *et al.* 2009). A polytomy is assumed here.
258. Originally constituted as Family Anguilluliniidae by Baylis & Daubney 1926, with the type genus *Anguillulina* Gervais & Van Beneden 1859, which was regarded as a senior synonym of the genus *Tylenchus* Bastian 1865. Chitwood (1935) re-established *Anguina* Scopoli 1777 and designated *Vibrio tritici* Steinbuch 1799 as type species by subsequent designation (syn *Rhabditis tritici* (Steinbuch 1799) Dujardin 1845, *Anguillula tritici* (Steinbuch 1799) Grube 1849, *Anguillulina tritici* (Steinbuch 1799) Gervais & Van Beneden 1859, *Tylenchus tritici* (Steinbuch 1799) Bastian 1865). The genus *Vibrio* refers to bacteria and Protozoa. The genus *Rhabditis* refers to a different genus. Thus, the oldest name is *Anguillulina tritici* (Steinbuch 1799) Gervais & Van Beneden 1859. This, however, was rejected as invalid by ICZN in rulings 329 & 341 (1958). After Chitwood's (1935) publication, Nicoll (in Zoological Record) proposed the replacement names Anguinidae and Anguinoidea, to replace the names Anguilluliniidae and Anguillulinoidea (and, coincidentally, Tylenchidae as well). Paramonov (1962) proposed Anguininae, which was raised to Family rank by Siddiqi (1971).
259. Terrestrial, plant-root or seed feeding. Some species cause economic damage. Some species associated with bacteria toxic to mammals.
260. External associates of beetles.
261. Originally created as a subfamily by Paramonov (1967).
262. Created as a subfamily by Taylor (1936).
263. Terrestrial, plant-root feeding. Some species cause economic damage.
264. Classification of Criconematidae follows Geraert 2010.
265. Created as a subfamily by Skarbilovich (1959), and as a superfamily by Siddiqi (2000).
266. Terrestrial, plant-root feeding. Some species cause economic damage.
267. Created as a subfamily by Thorne (1949).

Family **Sphaeronematidae** Raski & Sher 1952 (Geraert 1966) (2 subfamilies, 4 genera, 12 species)<sup>269,270</sup>

Family **Tylenchulidae** Skarbilovich 1947 (Kirjanova 1955) (1 subfamily, 3 genera, 17 species)<sup>271,272</sup>

Superfamily **Sphaerularioidea** Poinar 1975 (5 families)

Family **Allantonematidae** Pereira 1931 (Chitwood & Chitwood 1937) (2 subfamilies, 18 genera, 148 species)

Family **Iotonchiidae** Goodey 1953 (Skarbilovich 1959) (1 subfamily, 4 genera, 20 species)<sup>273,274</sup>

Family **Neotylenchidae** Thorne 1941 (Thorne 1949) (5 subfamilies, 14 genera, 89 species)<sup>275</sup>

Family **Parasitylenchidae** Siddiqi 1986 (5 subfamilies, 12 genera, 50 species)<sup>276</sup>

Family **Sphaerulariidae** Lubbock 1861 (Skarbilovich 1947) (1 subfamily, 3 genera, 28 species)<sup>277,278</sup>

Superfamily **Tylenchoidea** Oerley 1880 (Chitwood & Chitwood 1937) (14 families)<sup>279</sup>

Family **Atylenchidae** Skarbilovich 1959 (2 subfamilies, 2 genera, 7 species)<sup>280</sup>

Family **Belonolaimidae** Whitehead 1959 (Golden 1971) (1 subfamily, 4 genera, 19 species)<sup>281,282</sup>

Family **Boleodoridae** Khan 1964 (Brzeski & Sauer 1983) (2 subfamilies, 6 genera, 97 species)

Family **Dolichodoridae** Chitwood & Chitwood 1950 (Skarbilovich 1959) (2 subfamilies, 3 genera, 30 species)<sup>283,284</sup>

Family **Ecphyadophoridae** Skarbilovich 1959 (2 subfamilies, 8 genera, 25 species)<sup>285</sup>

Family **Heteroderidae** Filipjev 1934 (Skarbilovich 1947) (3 subfamilies, 15 genera, 148 species)<sup>286,287</sup>

Family **Hoplolaimidae** Filipjev 1934 (Weiser 1953) (3 subfamilies, 11 genera, 455 species)<sup>288,289</sup>

Family **Meloidogynidae** Skarbilovich 1959 (Wouts 1973) (2 subfamilies, 6 genera, 106 species)<sup>290,291</sup>

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268. Terrestrial, plant-root feeding. Some species cause economic damage.

269. Created as a subfamily by Raski & Sher (1952).

270. Terrestrial, plant-root feeding. Some species cause economic damage.

271. Created as a subfamily by Skarbilovich (1947).

272. Terrestrial, plant-root feeding. Some species cause economic damage.

273. Created as a subfamily by Goodey (1953).

274. Alternating generations of internal parasites of insects and free-living fungivorous or plant-root feeding nematodes.

275. Alternating generations of internal parasites of insects and free-living fungivorous or plant-root feeding nematodes.

276. Alternating generations of internal parasites of insects and free-living fungivorous or plant-root feeding or rarely non-feeding nematodes.

277. Created as subfamily Spherulariaceae by Lubbock (1861).

278. Internal parasites of insects.

279. The arrangement of the families Tylenchidae, Boleodoridae, Ecphyadophoridae, Atylenchidae, Tyldoridae and Psilenchidae differs markedly among different analyses of relationships using both morphological and molecular evidence. Siddiqi (2000) regarded Tylenchidae, Ecphyadophoridae, Atylenchidae, Tyldoridae and Psilenchidae as separate families, but with Boleodorinae as subfamily of Tylenchidae (along with several others) and Psilenchidae in a separate suborder. Geraert (2008) regarded Atylenchinae, Boleodorinae, Ecphyadophorinae, Tylenchinae and Tyldorinae as subfamilies of a greater Tylenchidae and did not recognise Psilenchidae because it was embedded within Tylenchinae. Holterman *et al.* (2006, 2008) and Bert *et al.* (2008) identified Tyldoridae as divergent from the other families and Ecdyaphoridae as unresolved. Van Megen *et al.* (2009) resolved Tylenchidae into at least two different resolved clades (Tylenchinae and Duosulciinae), and Ecphyadophoridae was resolved from both, with the relationships of the other families unresolved. In view of this conflicting evidence, all the clades clearly identifiable by either molecular or morphological analyses are regarded as separate families arising separately from a polytomy. Only extensive analyses of many species from each of these clades, analysed using multiple genetic and morphological characters, are likely to satisfactorily resolve this situation.

280. Terrestrial or freshwater aquatic habitats, feed externally on plant roots. Not known to cause economic damage to plants.

281. Created as a subfamily by Whitehead (1959).

282. Terrestrial, feed externally on plant roots. Some cause economic damage, but some are not regarded as economic pests.

283. Created as a subfamily by Chitwood (1950).

284. Terrestrial, feed mostly externally on plant roots. Some cause economic damage, but some are not regarded as economic pests.

285. Terrestrial or freshwater aquatic habitats, feed externally on plant roots. Not known to cause economic damage to plants.

286. Created as a subfamily by Filipjev (1934).

287. Terrestrial or very rarely estuarine, feed mostly internally on plant roots. Many cause economic damage, but some are not regarded as economic pests.

288. Created as a subfamily by Filipjev (1934).

289. Terrestrial or rarely freshwater aquatic, feed mostly externally on plant roots but may partially enter the root. Many cause economic damage, but some are not regarded as economic pests.

Family **Psilenchidae** Paramonov 1967 (Khan 1969) (2 subfamilies, 3 genera, 26 species)<sup>292,293</sup>  
 Family **Pratylenchidae** Thorne 1949 (Siddiqi 1963) (4 subfamilies, 12 genera, 233 species)<sup>294,295</sup>  
 Family **Rotylenchulidae** Husain & Khan 1967b (Fotedar & Handoo 1975) (3 subfamilies, 5 genera, 18 species)<sup>296,297</sup>  
 Family **Telotylenchidae** Siddiqi 1960 (Loof 1987) (4 subfamilies, 19 genera, 391 species)<sup>298,299</sup>  
 Family **Tylenchidae** Oerley 1880 (Marcinowski 1909) (3 subfamilies, 22 genera, 282 species)<sup>300,301</sup>  
 Family **Tylodoridae** Allen & Sher 1967 (Siddiqi 1976) (3 subfamilies, 7 genera, 29 species)<sup>302,303</sup>

Order **Rhabditida** Chitwood 1933 (7 suborders)<sup>304</sup>

Suborder **Ablechroiulina** Hodda 2007 (1 superfamily)<sup>305</sup>

Superfamily **Ablechroiuloidea** Hodda 2007 (1 family)

Family **Ablechroiulidae** Andrassy 1976 (Hodda 2007) (1 genus, 14 species)<sup>306,307</sup>

Suborder **Agfina** Hodda 2007 (1 superfamily)<sup>308</sup>

Superfamily **Agfoidea** Dougherty 1955 (Hodda 2007) (1 family)

Family **Agfidae** Dougherty 1955 (1 genus, 3 species)<sup>309</sup>

Suborder **Angiostomatina** n. rank

Superfamily **Angiostomatoidea** R. Blanchard 1895 (n. rank)

Family **Angiostomatidae** R. Blanchard 1895 (3 genera, 17 species)

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290. Created as a subfamily by Skarbilovich (1959).  
 291. Terrestrial, feed mostly internally on plant roots. Many cause economic damage, but some are not regarded as economic pests.  
 292. Created as a subfamily by Paramonov (1967).  
 293. Terrestrial, feed externally on plant roots. Some cause economic damage, but many are not regarded as economic pests.  
 294. Created as a subfamily by Thorne (1949).  
 295. Terrestrial, feed externally or internally on plant roots. Many cause economic damage, but some are not regarded as economic pests.  
 296. Created as a subfamily by Husain & Khan (1967b).  
 297. Terrestrial, feed mostly externally on plant roots but may partially enter the root. Some cause economic damage, but some are not regarded as economic pests.  
 298. Created as a subfamily by Siddiqi (1960). Telotylenchidae first used at family level by Loof (1987) when transferring the genus *Telotylenchus* to the family Tylenchorhynchidae Eliava 1964.  
 299. Terrestrial, feed externally on plant roots. Some cause economic damage, but some are not regarded as economic pests.  
 300. Created as a subfamily by Oerley (1880).  
 301. Mostly terrestrial or less frequently freshwater aquatic or very rarely estuarine or marine, plant-root or algal feeders. A few cause economic damage, but most are not regarded as economic pests.  
 302. Created as a subfamily by Paramonov (1967).  
 303. Terrestrial or rarely freshwater aquatic, feed externally on plant roots. Some cause economic damage, but many are not regarded as economic pests.  
 304. Spermatogenesis and development provide evidence for the separation of Spirurida, Rhabditida and Panagrolaimida (Yushin & Malakhov 2004, Schierenberg & Lahl 2004).  
 305. A separate suborder pending resolution of affinities, which are currently unresolved on morphological or molecular evidence (Andrassy 1974, Meldal *et al.* 2007). Includes the genus *Rhabditoides* (Andrassy 1976), and clearly within Rhabditida (Andrassy 1976, De Ley *et al.* 2006, Hodda 2007).  
 306. Andrassy (1976) originally proposed subfamily Ablechroiulinae to include the genera *Ablechroiulus* and *Rhabditoides* Goodey 1929, both genera having in common the possession of bundles of cirri-like bristles on lip region, among other features. Sudhaus & Fitch (2001) provided an updated classification of Rhabditidae Örley 1980 but maintained on the basis of morphological and molecular data that *Ablechroiulus* was a junior synonym of *Rhabditis* (*Rhabditis*), one of the 15 subgenera in which Sudhaus (1976) subdivided the genus. Andrassy (1976, 1983, 1984, 2005) did not accept Sudhaus' scheme. Molecular trees showed that one species of *Ablechroiulus* (*A. dudichi* or *Choriorhabditis dudichi* Sudhaus scheme), is not distinctly clustered with other representatives of the subgenus *Rhabditis*. This result was also obtained by Holterman *et al.* (2006). Kiontke & Fitch (2005) included three *Ablechroiulus* species in their molecular study (*brassicae*, *cristatus* and *dudichi*): *A. brassicae* clustered with *Rhabditis* species and the other two formed a clade at the base of the Eurhabditis group. The genus was re-examined by Abolafia & Pena Santaigo (2009, 2011), who briefly discussed the identity of *Ablechroiulus*, and characterized it mainly on the base of the presence of short labial setae, classifying it under the subfamily Rhabditinae Örley, 1880, and regarding Ablechroiulinae Andrassy, 1976 as a junior synonym of that taxon. In view of the highly unresolved position of the group, either morphologically or molecularly, it is here regarded as a separate clade. The cirri-like bristles are a unique apomorphy.  
 307. Terrestrial, microbivorous.  
 308. Placed with moderate support in Peloderidae on molecular evidence (Ross *et al.* 2010), but other molecular evidence is lacking (De Ley & Blaxter 2004). The position of Agfidae is unresolved on morphological evidence (Ribas & Casanova 2002, Inglis 1983), and it has been placed within Cylindrocorporoidea, Myolaimidae and Rhabditomorpha. There are only 3 species of the family, which are all parasites of slugs. All have an unusual combination of characters, some of which may be plesiomorphic for Rhabditina, and some of which may be apomorphic hence its current placement as a suborder. More investigation is required.  
 309. Terrestrial, microbivorous, internal parasites of molluscs.



- Suborder **Brevibuccina** Hodda 2007 (1 superfamily)<sup>310</sup>  
 Superfamily **Brevibuccoidea** Paramonov 1956 (Hodda 2007) (1 family)  
 Family **Brevibuccidae** Paramonov 1956 (Goodey 1963) (1 subfamily, 2 genera, 4 species)<sup>311,312</sup>
- Suborder **Bunonematina** Siddiqi 1980 (2 superfamilies)<sup>313</sup>  
 Superfamily **Bunonematoidea** Paramonov 1956 (Andrassy 1971) (2 families)  
 Family **Bunonematidae** Paramonov 1956 (10 genera, 2 subgenera, 42 species)<sup>314,315</sup>  
 Family **Pterygorhabditidae** Goodey 1963 (Andrassy 1971) (1 genus, 4 species)<sup>316,317</sup>  
 Superfamily **Odontopharyngoidea** Micoletzky 1922 (1 family)  
 Family **Odontopharyngidae** Micoletzky 1922 (1 genus, 2 species)<sup>318,319</sup>
- Suborder **Peloderina** Hodda 2007 (1 superfamily)  
 Superfamily **Mesorhabditoidea** Andrassy 1976 (De Ley & Blaxter 2002) (3 families)  
 Family **Mesorhabditidae** Andrassy 1976 (De Ley & Blaxter 2002) (1 subfamily, 3 genera, 29 species)<sup>320,321</sup>  
 Family **Parasitorhabditidae** Lazarevskaya 1965 (Hodda 2007) (1 subfamily, 1 genus, 43 species)<sup>322,323</sup>  
 Family **Peloderidae** Andrassy 1976 (De Ley & Blaxter 2002) (1 subfamily, 4 genera, 32 species)<sup>324,325</sup>
- Suborder **Rhabditina** Chitwood 1933 (3 superfamilies)  
 Superfamily **Heterorhabditoidea** Poinar 1975 (n. rank) (2 families)<sup>326</sup>  
 Family **Heterorhabditidae** Poinar 1975 (1 genus, 15 species)<sup>327</sup>  
 Family **Syrphonematidae** Laumond & Lyon 1971 (1 genus, 1 species)  
 Superfamily **Rhabditoidea** Oerley 1880 (Travassos 1920) (2 families)  
 Family **Diploscapteridae** Micoletzky 1922 (Andrassy 1983) (1 subfamily, 2 genera, 9 species)<sup>328,329</sup>  
 Family **Rhabditidae** Oerley 1880 (5 subfamilies, 38 genera, 11 subgenera, 229 species)<sup>330</sup>  
 Superfamily **Strongyloidea** Baird 1853 (Railliet & Henry 1913) (4 families)<sup>331</sup>  
 Family **Ancylostomatidae** Looss 1905 (Looss 1911) (2 subfamilies, 2 tribes, 6 subtribes, 20 genera, 144 species)<sup>332,333</sup>

310. On morphological evidence the family has been placed as unresolved in Rhabditida (Lorenzen 1994). On molecular evidence, the family has been unresolved within Rhabditida (De Ley & Blaxter 2004, Holterman *et al.* 2006, Meldal *et al.* 2007, Van Megen *et al.* 2009). In all cases a resolution between Rhabditina and Diplogasterina has not been possible.
311. Created as a subfamily by Paramonov (1956).
312. Terrestrial, microbivorous.
313. Diplogastrina [*sic*] and *Bunonema* have been regarded as closely related on the basis of five morphological synapomorphies: mainly related to fine structure of buccal cavity, but also genital papillae (Von Lieven & Sudhaus 2000). It is unclear what group(s) these characters are synapomorphies of: potentially they could be synapomorphies of Rhabditida, in which case these characters would not conflict with the molecular evidence placing *Bunonema* in Rhabditida (Holterman *et al.* 2006), but the affinities of Bunonematidae are unresolved in other analyses (Van Megen *et al.* 2009). Placed in Rhabditida on the basis of morphological similarity (De Ley *et al.* 2006, Goodey 1963, Hodda 2007), but as a separate suborder.
314. Created as a subfamily by Micoletzky (1922).
315. Terrestrial, microbivorous.
316. Created as a subfamily created by Goodey (1963).
317. Terrestrial, microbivorous.
318. Created as a subfamily by Filipjev & Schuurmans Stekhoven (1941).
319. Terrestrial, microbivorous or predatory.
320. Created as a subfamily by Andrassy (1976).
321. Terrestrial, microbivorous.
322. The genus *Parasitorhabditis* was previously placed in Rhabditidae, but it is unambiguously a separate clade associated with Peloderina on molecular evidence (Holterman *et al.* 2006, Meldal *et al.* 2007).
323. Terrestrial, microbivorous, associated with arthropods.
324. Created as a subfamily by Andrassy (1976).
325. Terrestrial, microbivorous, but includes a species living on wood mice hair follicles and the conjunctiva of mice, voles or lemmings.
326. A separate clade according to the molecular analysis of Chilton *et al.* (2006)
327. Terrestrial, microbivorous, internal associates of arthropods which are vectors of pathogenic bacteria and are used as biocontrol agents.
328. Created as a subfamily by Chitwood & Chitwood (1937).
329. Terrestrial, microbivorous.
330. Terrestrial, microbivorous, often associated with invertebrates, occasionally internally.
331. The authorities of supra generic taxa in this group have been discussed extensively (Dougherty 1944).
332. Created as a subfamily by Looss (1905).

- Family **Metastrongylidae** Leiper 1912 (8 subfamilies, 4 tribes, 65 genera, 10 subgenera, 289 species)<sup>334,335</sup>
- Family **Strongylidae** Baird 1853 (4 subfamilies, 9 tribes, 17 subtribes, 115 genera, 14 subgenera, 661 species)<sup>336</sup>
- Family **Trichostrongylidae** Lieper 1908 (Leiper 1912) (3 subfamilies, 15 tribes, 29 subtribes, 224 genera, 6 subgenera, 1321 species)<sup>337,338 339,340</sup>
- Order **Spirurida** Railliet 1914 (6 suborders)<sup>341</sup>
- Suborder **Ascaridina** Inglis 1983 (5 superfamilies)
- Superfamily **Ascaridoidea** Baird 1853 (Skryabin 1915) (5 families)
- Family **Anisakidae** Railliet & Henry 1912b (Skryabin & Karokhin 1945) (4 subfamilies, 2 tribes, 18 genera, 224 species)<sup>342,343</sup>
- Family **Ascaridae** Baird 1853 (4 subfamilies, 4 tribes, 34 genera, 402 species)<sup>344</sup>
- Family **Crossophoridae** Baylis 1920 (Hartwich 1957) (1 subfamily, 2 genera, 2 species)
- Family **Heterocheilidae** Railliet & Henry 1915 (1 genus, 2 species)<sup>345,346</sup>
- Family **Raphidascarididae** Hartwich 1954 (Fagerholm 1990) (4 subfamilies, 1 tribe, 9 genera, 193 species)<sup>347,348</sup>
- Superfamily **Cosmoceroidea** Skryabin & Shikhobalova 1951 (3 families)
- Family **Atractidae** Railliet 1917 (Travassos 1920) (21 genera, 65 species)<sup>349,350</sup>
- Family **Cosmocercidae** Railliet 1916 (Travassos 1925) (3 subfamilies, 23 genera, 187 species)<sup>351,352</sup>
- Family **Kathlaniidae** Lane 1914 (Travassos 1918) (3 subfamilies, 19 genera, 158 species)<sup>353,354</sup>
- Superfamily **Heterakoidea** Railliet & Henry 1912b (Chabaud 1957) (3 families)
- Family **Ascaridiidae** Travassos 1920 (1 genus, 33 species)<sup>355</sup>
- Family **Aspidoderidae** Skryabin & Shikhobalova 1947 (Freitas 1956) (2 subfamilies, 7 genera, 26 species)<sup>356</sup>
- Family **Heterakidae** Railliet & Henry 1912b (3 subfamilies, 16 genera, 132 species)<sup>357</sup>
- Superfamily **Seuratoidea** Hall 1916 (Chabaud *et al.* 1959) (5 families)
- Family **Chitwoodchabaudiidae** Puylaert 1970 (1 genus, 1 species)<sup>358</sup>
- Family **Cucullanidae** Cobbold 1864 (2 subfamilies, 5 genera, 5 subgenera, 219 species)<sup>359</sup>
- Family **Quimperidae** Gendre 1928 (Baylis 1930) (2 subfamilies, 18 genera, 79 species)<sup>360,361</sup>

333. Internal parasites of mammals.
334. Created as a subfamily by Lieper (1908).
335. Internal parasites of mammals.
336. Internal parasites of mammals or occasionally birds or reptiles.
337. Attributed also to Witenberg (1925) by De Ley & Blaxter (2002).
338. Internal parasites of amphibians, reptiles, birds or mammals.
339. Classification follows Durette-Desset Spratt & Beveridge (2012 Handbuch fuer Zoologie), and Durette Desset *et al.* (1999) except generally 1 full taxonomic rank lower
340. Ichthyostongylidae Yamaguti 1961 of doubtful validity as a group and included here (Beveridge *et al.* 2010).
341. Spermatogenesis and development provide evidence for the separation of Spirurida, Rhabditida and Panagrolaimida (Yushin & Malakhov 2004, Schierenberg & Lahl 2004).
342. Created as a subfamily by Railliet & Henry (1912).
343. Internal parasites of vertebrates.
344. Internal parasites of amphibians, reptiles, birds or mammals, rarely of fish.
345. Subfamily created by Railliet & Henry (1912).
346. Internal parasites of marine mammals.
347. Created as a subfamily by Hartwich (1954).
348. Internal parasites of fish.
349. Created as a subfamily by Railliet (1917).
350. Internal parasites of vertebrates.
351. Created as a subfamily by Railliet (1916).
352. Internal parasites of amphibians or rarely of reptiles.
353. Created as a subfamily by Lane (1914).
354. Internal parasites of vertebrates.
355. Internal parasites of birds or rarely mammals.
356. Internal parasites of mammals.
357. Internal parasites of amphibians or reptiles or birds or mammals.
358. Internal parasites of amphibians.
359. Internal parasites of fish or rarely aquatic reptiles.

- Family **Schneideriematidae** Freitas 1956 (2 subfamilies, 5 genera, 7 species)<sup>362</sup>
- Family **Seuratidae** Hall 1916 (Railliet 1906) (3 subfamilies, 13 genera, 44 species)<sup>363</sup>
- Superfamily **Subuluroidea** Travassos 1914 (Travassos 1930) (2 families)
- Family **Maupasiniidae** Inglis 1960 (1 genus, 2 species)<sup>364</sup>
- Family **Subuluridae** Travassos 1914 (Yorke & Maplestone 1926) (5 subfamilies, 13 genera, 5 subgenera, 107 species)<sup>365,366</sup>
- Suborder **Dracunculina** Hodda 2007 (2 superfamilies)<sup>367</sup>
- Superfamily **Anguilliculoidea** Yamaguti 1935 (Moravec 2006) (1 family)
- Family **Anguillicolidae** Yamaguti 1935 (2 genera, 5 species)<sup>368</sup>
- Superfamily **Dracunculoidea** Stiles 1907 (Lieper 1912) (8 families)
- Family **Daniconematidae** Moravec & Koie 1987 (3 genera, 4 species)<sup>369</sup>
- Family **Dracunculidae** Stiles 1907 (Lieper 1912) (3 genera, 16 species)<sup>370,371</sup>
- Family **Guyanemidae** Petter 1974 (2 subgenera, 6 genera, 15 species)<sup>372</sup>
- Family **Micropleuridae** Baylis & Daubney 1926 (Travassos 1960) (2 subfamilies, 6 genera, 15 species)<sup>373</sup>
- Family **Philometridae** Baylis & Daubney 1926 (3 sub families, 11 genera, 117 species)<sup>374</sup>
- Family **Phlyctainophoridae** Roman 1965 (1 genus, 3 species)<sup>375</sup>
- Family **Skrjabillanidae** Shigin & Shigina 1958 (2 subfamilies, 4 genera, 7 species)<sup>376</sup>
- Family **Tetanonematidae** Skryabin & Shikhobalova 1948 (1 genus, 1 species)
- Suborder **Gnathostomatina** Skryabin & Ivaschkin 1973 (1 superfamily)<sup>377</sup>
- Superfamily **Gnathostomatoidea** Railliet 1895 (Ivaschkin 1960) (1 family)
- Family **Gnathostomatidae** Railliet 1895 (3 subfamilies, 5 genera, 61 species)<sup>378</sup>
- Suborder **Oxyurina** Railliet 1916 (2 superfamilies)
- Superfamily **Oxyuroidea** Cobbold 1864 (3 families)
- Family **Heteroxyenematidae** Skryabin & Shikhobalova 1948 (2 subfamilies, 13 genera, 59 species)<sup>379</sup>
- Family **Oxyuridae** Cobbold 1864 (54 genera, 23 subgenera, 257 species)<sup>380</sup>
- Family **Pharyngodonidae** Travassos 1920 (13 genera, 6 subgenera, 359 species)<sup>381</sup>
- Superfamily **Thelastomatoidea** Travassos 1929 (5 families)
- Family **Hystriognathidae** Travassos 1929 (29 genera, 104 species)<sup>382</sup>
- Family **Protrelloididae** Chitwood 1932 (Adamson & Van Waerebeke 1992) (1 subfamily, 5 genera, 27 species)<sup>383,384</sup>

360. Created as a subfamily by Gendre (1928).

361. Internal parasites of freshwater fish or amphibians.

362. Internal parasites of birds or mammals.

363. Internal parasites of amphibians or reptiles or birds or mammals.

364. Created as a subfamily by Lopez-Neyra (1945), but a synonym of Dubioxuridae Ortlepp 1937 which has not been used because the type genus *Duboxuris* Ortlepp 1937 has been synonymized with *Maupasina* Seurat 1913.

365. Internal parasites of birds or mammals.

366. Internal parasites of mammals.

367. The affinities of Dracunculoidea have long been with Spirurida on morphological grounds (Chabaud 1974), and were unresolved in early molecular analyses (Holterman *et al.* 2006, De Ley & Blaxter 2004), then clear molecular evidence was presented for affinities with Spirurida (Van Megen *et al.* 2009).

368. Internal parasites of fish.

369. Internal parasites of fish

370. Created as a subfamily by Stiles (1907).

371. Internal parasites of reptiles or birds or mammals.

372. Internal parasites of fish.

373. Internal parasites of reptiles.

374. Internal parasites of fish.

375. Internal parasites of selachian fish.

376. Internal parasites of freshwater fish.

377. Created as order Gnathostomatata.

378. Internal parasites of fish or amphibians or reptiles or mammals.

379. Internal parasites of birds or mammals (rodents or lagomorphs).

380. Internal parasites of mammals.

381. Internal parasites of fish or amphibians or reptiles, rarely of mammals.

382. Internal parasites of terrestrial insects.

- Family **Pseudonymidae** Adamson & Buck 1990 (1 subfamily, 5 genera, 28 species)<sup>385,386</sup>
- Family **Thelastomatidae** Travassos 1929 (39 genera, 242 species)<sup>387</sup>
- Family **Travassosinematidae** Rao 1958 (10 genera, 46 species)<sup>388</sup>
- Suborder **Rhigonematina** Inglis 1983 (2 superfamilies)
- Superfamily **Ransomnematoidea** Travassos 1930 (3 families)
- Family **Carnoyidae** Filipjev 1934 (Travassos & Kloss 1960) (1 subfamily, 14 genera, 54 species)<sup>389</sup>
- Family **Hethidae** Skryabin & Shikhobalova 1951 (Travassos & Kloss 1960) (1 subfamily, 2 genera, 39 species)<sup>390</sup>
- Family **Ransomnematidae** Travassos 1930 (3 genera, 16 species)<sup>391</sup>
- Superfamily **Rhigonematoidea** Artigas 1930 (Kloss 1960) (3 families)
- Family **Ichthyocephalidae** Travassos & Kloss 1958 (4 genera, 23 species)<sup>392</sup>
- Family **Rhigonematidae** Artigas 1930 (3 genera, 60 species)<sup>393</sup>
- Family **Xustromatidae** Hunt 2002 (4 genera, 13 species)<sup>394</sup>
- Suborder **Spirurina** Railliet & Henry 1915 (10 superfamilies)<sup>395</sup>
- Superfamily **Acuarioidea** Railliet Henry & Sissoff 1912 (Sobolev 1949) (1 family)
- Family **Acuariidae** Railliet Henry & Sissoff 1912 (Chabaud 1975) (3 subfamilies, 39 genera, 2 subgenera, 299 species)<sup>396,397</sup>
- Superfamily **Aproctoidea** Yorke & Maplestone 1926 (Chabaud 1975) (2 families)
- Family **Aproctidae** Yorke & Maplestone 1926 (Skryabin & Shikhobalova 1945) (2 subfamilies, 6 genera, 59 species)<sup>398,399</sup>
- Family **Desmidocercidae** Cramm 1927 (1 subfamily, 4 genera, 8 species)<sup>400</sup>
- Superfamily **Camallanoidea** Railliet & Henry 1915 (Travassos 1920) (2 families)
- Family **Camallanidae** Railliet & Henry 1915 (10 genera, 347 species)<sup>401</sup>
- Family **Physalopteridae** Railliet 1893 (Lieper 1908) (3 subfamilies, 16 genera, 4 subgenera, 290 species)<sup>402,403</sup>
- Superfamily **Diplotriaenoidea** Skryabin 1916 (Anderson 1958) (1 family)<sup>404</sup>
- Family **Diplotriaenidae** Skryabin 1916 (Anderson 1958) (2 subfamilies, 13 genera, 107 species)<sup>405</sup>
- Superfamily **Filarioidea** Weinland 1858 (Chabaud & Anderson 1959) (2 families)
- Family **Filariidae** Weinland 1858 (Cobbold 1879) (2 subfamilies, 13 genera, 72 species)<sup>406,407</sup>

383. Created as a subfamily by Chitwood (1932).

384. Internal parasites of insects.

385. First subfamily Gyoeryiinae Kloss (1958), but with genus synonymization of genus *Gyoeryia* Kloss 1958 with *Pseudonymus* Diesing 1857 by Adamson & Van Waerebeke (1992), the first name used as a family was Pseudonymidae Adamson & Van Waerebeke 1992.

386. Internal parasites of terrestrial insects.

387. Parasites of invertebrates.

388. Parasites of diplopods and insects.

389. Internal parasites of diplopods or rarely myriapods.

390. Internal parasites of diplopods or rarely myriapods.

391. Internal parasites of diplopods or rarely myriapods.

392. Internal parasites of diplopods.

393. Internal parasites of diplopods or myriapods.

394. Parasites of diplopods or rarely myriapods.

395. Originally named suborder Spirurata (Railliet & Henry 1915) prior to adoption of current system of uniform endings of higher-ranked taxon names. First used in current form by Chitwood (1937).

396. Created as a subfamily by Railliet, Henry & Sissoff (1912).

397. Internal parasites of birds or rarely mammals.

398. Created as a subfamily by Yorke & Maplestone (1926).

399. Internal parasites of birds.

400. Internal parasites of birds.

401. Internal parasites of fish, amphibians and reptiles.

402. Created as a subfamily by Railliet (1893).

403. Internal parasites of fish, amphibians, reptiles and occasionally birds and mammals.

404. Created as a subfamily by Skryabin (1916).

405. Internal parasites of reptiles or birds.

406. Created as a subfamily by Weinland (1858).

407. Internal parasites of amphibians, reptiles, birds and mammals.



Family **Onchocercidae** Lieper 1911 (Chabaud & Anderson 1959) (6 subfamilies, 87 genera, 668 species)<sup>408,409</sup>

Superfamily **Habronematoidea** Chitwood & Wehr 1932 (Anderson *et al.* 1974) (4 families)<sup>410</sup>

Family **Cystidicolidae** Skryabin *et al.* 1949 (22 genera, 178 species)<sup>411,412</sup>

Family **Habronematidae** Chitwood & Wehr 1932 (Ivashkin 1961) (3 subfamilies, 21 genera, 5 subgenera, 131 species)<sup>413,414</sup>

Family **Hedruridae** Petter 1971 (1 genus, 12 species)<sup>415</sup>

Family **Tetrameridae** Travassos 1914 (3 subfamilies, 6 genera, 111 species)<sup>416</sup>

Superfamily **Lucionematoidea** Moravec *et al.* 1998 (n. rank)<sup>417</sup>

Family **Lucionematidae** Moravec *et al.* 1998 (1 genus, 1 species)<sup>418</sup>

Superfamily **Rictularioidea** Railliet 1916 (Anderson *et al.* 1974) (1 family)

Family **Rictulariidae** Railliet 1916 (5 genera, 5 subgenera, 91 species)<sup>419,420</sup>

Superfamily **Spiruroidea** Oerley 1885 (Railliet & Henry 1915) (5 families)

Family **Gongylonematidae** Sobolev 1949 (1 genus, 3 subgenera, 36 species)<sup>421,422</sup>

Family **Hartertiidae** Chabaud 1975 (2 genera, 11 species)<sup>423,424</sup>

Family **Spirocercidae** Chitwood & Wehr 1932 (Chabaud 1975) (3 subfamilies, 21 genera, 3 subgenera, 77 species)<sup>425,426</sup>

Family **Spiruridae** Oerley 1885 (11 genera, 58 species)<sup>427</sup>

Family **Tricheilidae** Wang & Wang 1991 (1 genus, 1 species)<sup>428</sup>

Superfamily **Thelazioidea** Railliet 1910 (Sobolev 1949) (3 families)

Family **Pneumospiruridae** Wu & Hu 1938 (3 genera, 10 species)<sup>429</sup>

Family **Rhabdochonidae** Skryabin 1946 (11 genera, 4 subgenera, 174 species)<sup>430,431</sup>

Family **Thelaziidae** Railliet 1910 (2 subfamilies, 7 genera, 8 subgenera, 82 species)<sup>432</sup>

Superorder **Teratocephalica** Hodda 2007 (1 order)<sup>433</sup>

Order **Teratocephalida** Goodey 1963 (1 suborder)

Suborder **Teratocephalina** Andrassy 1974 (1 superfamily)

Superfamily **Teratocephaloidea** Andrassy 1958 (Andrassy 1974) (1 family)

Family **Teratocephalidae** Andrassy 1958 (2 genera, 20 species)<sup>434</sup>

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408. Created as a subfamily by Lieper (1911). Onchocercidae is preferred to Dipelonematidae Wehr 1935 because the former is in wide use and the latter is not.
409. Internal parasites of amphibians, reptiles, birds or mammals.
410. This superfamily should be designated Tetrameroidea because the family Tetrameridae Travassos 1914 has priority over Hedrurinae Railliet 1916, and Histioccephalinae Gendre 1922, and Habronematinae Chitwood & Wehr 1932 (Chabaud 1974). However, to preserve stability and because the other families are unusual for the group, Habronematoidea was chosen as the name for the group (Chabaud 1974).
411. Created as a subfamily by Skryabin (1946).
412. Internal parasites of fishes.
413. Habronematidae (originally created as a subfamily by Chitwood & Wehr (1932)) is used in preference to Histioccephalidae (derived from a subfamily created by Gendre (1922) because the former is in wide use and the latter has not been used (Chabaud 1975).
414. Internal parasites of birds and mammals.
415. Internal parasites of amphibians and reptiles.
416. Internal parasites of birds or marine mammals.
417. The sole species in the family Lucionematidae has an unusual suite of characters for Spirurida (Moravec *et al.* 1998), so is placed in a separate superfamily.
418. Parasites of freshwater fish.
419. Created as a subfamily by Hall (1916).
420. Internal parasites of mammals.
421. Created as a subfamily by Hall (1916).
422. Internal parasites of birds or mammals.
423. Created as a subfamily by Quentin (1970).
424. Internal parasites of birds.
425. Created as a subfamily by Chitwood & Wehr (1932).
426. Internal parasites of birds and mammals.
427. Internal parasites of vertebrates.
428. Parasites of reptiles.
429. Parasites of the lungs of mammals.
430. Created as a subfamily by Travassos *et al.* (1928).
431. Mostly internal parasites of fish, occasionally of other vertebrates.
432. Mostly parasites of bird or mammal eyes.

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433. After a long period of uncertainty regarding phylogeny, Teratocephalidae was placed in a separate order on morphological evidence (Goodey 1963). Other interpretations have placed the family in Leptolaimina or Rhabditida (Lorenzen 1994, Andrassy 1976) or as unresolved (Zhang & Baldwin 2001, Blaxter *et al.* 2000). Molecular evidence suggests either a suborder within Rhabditida or Plectida (Holterman *et al.* 2006, Meldal *et al.* 2007) or an unresolved position (De Ley & Blaxter 2004). As a result of the conflicting evidence, an unresolved polytomy was suggested (Hodda 2007). The most recent molecular analysis placed the family as a separate, resolved clade equivalent with Rhabditica (Van Megen *et al.* 2009), hence confirming status as a superorder, but now resolved. Several authors have commented on the apparently very different phylogeny of this group, and speculated that such a high taxonomic level is not justified (eg Goodey 1963). However, current evidence means that this is the only viable status, and the Teratocephalidae is well supported molecularly (Van Megen *et al.* 2009).

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